EDUCATION

A FIRST BOOK

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PREFACE

THIS book furnishes an introduction to the study of education. It is, as entitled, a beginner's book. It will, I hope, prepare students in colleges and normal schools to see the significance of their more specialized studies in educational psychology and sociology, methods of teaching and class management, the history of educational theory and practice, and the applications of philosophy and ethics to education. It will also be of service to those whose study of the general facts and principles of education must be restricted to a brief course.

Ideally, a student of education should first know many facts of biology, psychology, sociology, ethics and the other sciences of man. But he also needs to know something about education in order to make his studies in these sciences theoretically and practically fruitful. So it seems desirable to have some brief, simple, untechnical account of the aims, means, methods and results of education, of the conditions set by the laws of human nature, and of the part that school education plays in American life. The account given in the present volume is necessarily very limited, but nowhere, I trust, inaccurate or misleading.

Teachers College,
Columbia University,
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CHAPTER I

THE MEANING AND VALUE OF EDUCATION

§ 1. *The Meaning of Education*

Its place amongst human arts and industries.

Man changes the world in which he is. He changes the earth's form, whether he only scrapes out a hole in which to hide, or removes mountains to join oceans. He changes its living beings when he kills one bird or when he plants or destroys a forest. His fellow-men and his own nature are no less truly changed by what he is and does.

The art of human life is to change the world for the better—to make things, animals, plants, men and oneself more serviceable for life's ends. Trees grow regardless of man's intent, but he prunes or trains them the better to satisfy his own wants, or plants others for the common good. Children, too, grow in part by inner impulses apart from man's direction, but man tries to change their original natures into forms which serve his needs. Each man singly tries, by producing certain changes and preventing others, to make the world of things and men better for himself; a group of men living together, so far as they possess wisdom, try to make things and men better for the group as a whole.

If human arts and industries are classified according to *what* is changed, education is grouped with government, hygiene, medicine, business administration, and the like, as one of the arts busied with the production and prevention of changes *in human beings.* There are no hard and fast barriers separating one of these divisions of human activity from another. The meanings of the terms—moral education and government, physical education and hygiene, industrial education and the direction of labor—overlap in the case of each pair. Education is not a word confined rigidly to specified occupations of man, but refers vaguely to more or less of human activity in the production and prevention of changes in other human beings. In the broadest sense, man is an educator in every act that changes any other man.

Its place as a part of science. Education is the production and prevention of changes. Its facts are a selection from the changes that go on in the world. Science, or knowledge, in reporting the ways of the world, groups all these changes oftenest according to the objects which change. Thus in astronomy it reports the nature and changes of the stars; in chemistry, those of the atoms; and in biology, those of plants and animals. The objects whose changes we study under education are living animals, usually those of the human species.

The changes going on in any one object are of

many sorts. Thus a man is a mass of matter subject to laws of gravitation, electrical conduction, and the like, so that some of the changes in him are for physics to study; he is also a concretion of atoms of nitrogen, oxygen, hydrogen, carbon and the like, so that some of the changes in him are for chemistry to study; other changes in men belong under anatomy; still others, under physiology; still others are referred to the many specialized sciences of intellect and character.

Which of the changes that go on in an animal shall be studied under the heading *Education*, is for science a matter of useful selection rather than of absolute necessary appropriateness. Thought can be logical, systematic and fruitful, no matter where it draws the line between educational and non-educational. It is customary to include under education the changes in intellect, character and skill, and to exclude the changes in the body's gross physical and chemical properties, such as the rate at which it falls, or the depth at which it floats. But the exact selection from the facts of a man's life which shall be called his education, may be decided by convenience. A thinker about human education may choose his subject matter freely from whatever sciences concern man. Physiology, the science of digestion, excretion, circulation and the like; psychology, the science of intellect and character; sociology, the science of man's behavior with other men in a community; pathology, the science of disturb-

ances of efficient life; even parts of physics and chemistry—all may contribute to the science of education. No clear boundary separates man's education from the rest of his life. In the broadest sense his education *is* his life.

§ 2. *The Need of Education*

To utilize the gifts of civilization.

If all human beings save new-born infants vanished to another planet, and if by a miracle the babies were kept alive for a score of years, preserving whatever knowledge and skill came from natural inner growth, and lacking only the influence of the educational activities of other men, they would, at the age of twenty-one, be a horde of animals. They would get a precarious living from fruits, berries and small animals, would easily become victims of malaria, yellow fever, small-pox and plague, and would know little more of language, mechanic arts or provision for the future than the monkeys. They would be distinguishable from other mammalian species chiefly by a much greater variety of bodily movements, especially of the hands, mouth-parts and face, a much quicker rate of learning, and a very much keener satisfaction in mental life for its own sake. They would consequently enjoy the remnants of civilization, using the books, tools, engines, and the like as toys, somewhat more intelligently than would apes, but they

would not read the books, repair the tools, or make of the engines more than spectacles for amusement, wonder and fear.

Whatever charms the life of a man left to his own original nature would have, it is certain that no wise man would choose that life for his children, and that the energies of men, so far back as we can trace them, have been spent in preventing that life by education.

So it is not enough to change the face of the world with cities, mines, farms and factories. Man must be taught to use them. Advantageous changes in the world's things produce their benefits only when accompanied by changes in the human natures who are to live with them.

The need of better education. Such education as man gives himself to-day prevents each new generation from stagnating in brutish ignorance, folly and pain. But far better education is needed to reduce the still appalling sum of error, injustice, misery and stupidity. Consider, for example, our present behavior toward war, labor and welfare.

For national welfare. Even the most civilized nations have not yet learned to settle international disputes by a court of expert judges, or to prevent national violence and law-breaking by an international police. Theft, arson and murder are still honored, provided they be done wholesale by a nation. And the wise opinion is that the only sure preventive of war is by educating men to think of it as a futile crime.

Even the most civilized nations also commit, year after year, the consummate blunder of not letting men work who wish to work and are able to work to the advantage of the common good. A President of this country is reported to have said when asked what should be done for the million unemployed, 'God knows.' But man must learn. Until man knows how to arrange national affairs so that no willing, capable worker shall be miserable in enforced idleness, education is incomplete.

For personal happiness. In even the most civilized nations the majority of men are not rational even about their own welfare. They do not value absolute goods, taking satisfaction in proportion to the beauty, property, leisure, friends, and the like which are theirs. On the contrary, very many of their satisfactions and discomforts are caused by purely relative conditions,—being better-looking than Jones, not owning so large a house as Smith's, having to work more than other men. It is pitifully true that many a man would object to being twice as well off as he now is, if the condition were attached that every one else should be ten times as well off. And some men are so stupid in their envy that they can hardly see the difference between, on the one hand, adding a given amount, x, to the welfare of all other men and, on the other, subtracting x from their own personal store. There is perhaps no greater barrier to human happiness than this

irrational bookkeeping of welfare in terms of relative status alone. For it, too, better education is the preventive and cure.

For control of nature. Education, too, is the necessary basis of all the arts and industries whereby man changes his outside conditions for the better. To so change them he must in each generation change himself. He must acquire the knowledge and skill, or the crops will not grow, the bacilli which cause disease will not be killed, the houses will not be built, the poems, paintings and operas will not be composed, humane and rational laws and institutions will not be established.

Means of making education better. Man improves education as he improves any other human activity—by open-minded thought about it, by learning the results of existing forms of it, by experimenting with other forms, and by clearing up and making reasonable our notions of what changes we should make in human beings and of how we should make them. Such impartial scientific study of man's efforts to change himself for the better has been receiving more and more attention within the last twenty years. In the case of school education, for instance, the actual changes wrought in boys and girls by this or that form of education are being measured, old and new methods are being tested by experiment in the same spirit of zeal and care for the truth that animates the man of science, and the educational

customs which have been accepted unthinkingly by 'use and wont' are being required to justify themselves to reason.

Such scientific study faces five problems or groups of problems, namely, those of:

1. The Aims of Education. What changes should be made in human beings by schools and other educating forces?
2. The Material or Subjects of Education. What is the original nature of the human beings whom we have to change? What are the principles or laws of human nature and behavior that we need to know in order to change men for the better?
3. The Means and Agents of Education. What forces are at our command in the task of producing and preventing changes in human beings?
4. The Methods of Education. How should these means and agents be brought to bear upon the subjects of education so as best to realize its aims?
5. The Results of Education. What have been the actual effects of different methods, means, and agents acting upon different kinds of human beings?

CHAPTER II

THE AIMS OF EDUCATION

§ 3. *The Values of Life*

All values depend on wants.

The value of any change in things or men is its value to somebody, its satisfaction of somebody's want. Things are not good and bad for no reason. Better and worse, worthy and harmful, right and wrong, have meaning only in reference to conscious beings whose lives can be made more satisfying or more bearable.

A thing or event or act or condition is not, in the last analysis, desirable because it is valuable. It is valuable because it is desirable,—because it satisfies a want or craving or impulse of some man or other conscious being. Suppose, for instance, that all creatures had been, and now and in the future were to be, blind. The most beautiful painting would be no better than the ugliest; for it could have made or make no difference to anybody. Suppose that all beings, past, present and future, existed equally well and equally happily without as with food—that no one wanted food or drink. Temperance would be no longer a virtue, and gluttony no longer a sin. They

would simply be accidental qualities like the color of one's eyes. For the temperate man would satisfy no want of his own or any one else's, nor would the glutton's acts imply deprivation for anybody else.

The values of human acts. Value or worth or the good means *power to satisfy wants.* One thing or act is more valuable or more worthy or better than another because it satisfies more wants or causes less privation. To discover the cause of, and a preventive of, cancer would thus be a very worthy act because it would add so much to and subtract so little from the world's sum of satisfaction and would abolish so many thwartings and deprivations.

Some acts, like the discovery of new truth about the world, or the production of a noble poem, are almost wholly good, since they are of enormous benefit to the world at large and need involve no sacrifice on the part of the one who does them. Some acts, like cruelty, useless worry or selfish idleness, are almost wholly bad, since they give little satisfaction to the one who commits them and none to any one else, and cause enormous amounts of misery.

Many changes in things and men possess elements both good and harmful, because, as the world is arranged, whatever is done in any given situation can hardly be best for everybody—a perfect satisfier for all. Even the mother's love for her child may make some unloved child, who

witnesses it, unhappier. If I work, there is probably somebody who would be more content if I remained idle with him. If I remain idle, somebody will have to go without what my labor would have produced.

§ 4. *Improving and Satisfying Human Wants*

Human life would be most successful if men and women wanted only what was good and had all their wants satisfied. The aim of existence should be to make our wants better and to satisfy them. If by education we could abolish the craving to tyrannize and oppress, so that no living being would feel it, replacing it by the craving to see others happy, the world would be richer; for we should have got rid of a want whose satisfaction was always at the expense of others, in favor of a want whose satisfaction came as a free gift from the satisfaction of others. When education gives a child the power to read, it in so far enriches the world by making that child's craving for knowledge more satisfiable.

The aims of education should then be: to make men want the right things, and to make them better able so to control all the forces of nature and themselves that they can satisfy these wants. We have to make use of nature, to cooperate with each other, and to improve ourselves.

The first great element in making human wants better is to increase the good will—the disposi-

tion to care for others' welfare as well as for one's own—the desire to see the good wants of others satisfied. To wish the welfare of all men is one of the best of wants, for it is a want which every satisfier of all will satisfy.

Increasing good will toward men.

Increasing the impersonal unselfish pleasures.

The second great means of making human wants better is to cultivate the impersonal pleasures. Some satisfactions, such as the enjoyment of productive labor, health, good reading and study, are impersonal in the sense that for one to have the pleasure does not prevent anybody else from having it. They are unlike the pleasures of eating or owning or wearing things, where the pleasure of one man usually uses up a possible means of satisfying some other man. One of the most nearly perfect of all impulses is the impulse to advance knowledge of ourselves and the world in which we are to live. For this impulse is impersonal—all men may profit by the truth. It enriches everybody else's possibilities of satisfying the same want—the more knowledge man has, the easier it is to get more. It predisposes men against unsatisfiable wants—to know what the world really is prevents us from wanting what it cannot give. It leads to the satisfaction of all good wants—knowledge is power.

The third great means of making human wants better is the elimination of wants which must in the nature of things bring about a surplus of dis-

satisfaction. Such, for instance, are the wants represented by superstition. To want the help of the fairies, or the power to command evil spirits, or not to begin a journey on Friday, would be harmful because such wants are desires to prevent injury from, or be helped by, things which do not exist. Only those wants which the universe as it is may somehow satisfy are worth keeping.

Diminishing the useless and harmful wants.

The chief aims of education with respect to the improvement of our wants are, then, to cultivate good will to men and the higher or impersonal or unselfish pleasures, and to get rid of irrational wants—wants not fitted to the world in which we live.

The means of satisfying wants.

Having taught himself to want the right things, man has to teach himself how to secure them. Knowledge of the world of things and men, skill in managing its forces, habits and ideals of perseverance, thoroughness, accuracy, self-control, open-mindedness, and the like, with bodily and mental health, are the chief elements which human nature has to cultivate in itself to this end. Men must either master the world in which they live or adapt themselves to it. To get on with it—that is, to satisfy their wants in and by it—they have to know it. They must also know themselves—the laws of their own nature—so as to cooperate to avoid waste and frustration. Moreover, just as one man singly must be patient, careful, ready

to learn and reasonable if he is to get the best for himself out of life, so all men together cannot get what they want merely by claiming it, but must train themselves in the intellectual virtues which give knowledge and power. Health they must have not only for its own sake as one of man's surest satisfiers, but also because it is so commonly a prerequisite to effective management of oneself, other men and the forces of nature.

Narrow and unjust aims for education.

No one is compelled by any inner necessity to accept as his aim in educating himself or his fellow-men, the improvement and satisfaction of human wants—the cultivation of a good will, impersonal pleasures, knowledge of things and men, habits of open-mindedness, and physical and mental efficiency. And only the best individuals do accept these aims. Fagin tried to debase Oliver's wants and to satisfy his own at the cost of every one else's. Manufacturers may try to fit the children of a community to be nothing save efficient workmen. Baptists may plan their schools in utter defiance of Methodist or Presbyterian wants. A parent may count the satisfaction of his child's vanity above the satisfaction of a hundred other children's rights.

Social pressure is required to prevent folly and injustice in education as elsewhere. Fagin can, if he likes, consider no wants save his own, but all men acting together can, if they like, hang him therefor. Parents may, if they like, consider no

wants save their child's, but other families can have that child expelled from the school, or the parents from the community. Manufacturers can vote to take money from high schools for trade-schools, but others vote also. The state can suppress sectarian schools altogether if it thinks that an unfair discrimination amongst wants is made by them.

The aims which the schools of the present serve thus represent a conflict of wants, some of them very bad wants. A father can get almost the worst possible education for his son by paying enough for it! Some school-masters use their pupils habitually as objects for futile domineering. Some trade and professional schools outrage common honesty in their pretensions. We all tend to wish our pupils to do us credit more than strict justice would allow. It is only in proportion as all men together learn the wisdom of cooperating to make the best out of the world for all men that the improvement of wants will be a general aim in practice, or the satisfaction of the wants of the various classes of men will be equitable.

The reader himself may choose, if he will, to educate children so that they will be better able to get ahead of others in struggles for power and gross sensory pleasures, or so that they will gratify selfish parental pride. And if the world at large is foolish enough to permit him to do so and pay him therefor, he may be in a sense ex-

cusable. But in so far as his own life is ruled by reason and the good will, he will choose rather to give the world, so far as he can, what reason and justice would decree for its total satisfaction.

§ 5. *Ultimate and Proximate Aims*

The need of particularized aims in practice.

The attainment of the ultimate, general aims of education implies often the attainment of numerous particularized aims. Thus the cultivation of the higher or impersonal pleasures comprises the cultivation of habits of good reading, rational curiosity, experimentation with natural phenomena, the appreciation of the fine arts, and the like. These ultimate aims also imply the prior attainment of subsidiary aims. Thus, to secure the impersonal pleasure of good reading, the ability to read and knowledge of what is good reading must be secured. To take another illustration, the ultimate aim in teaching chemistry to high-school pupils should be to cultivate various intellectual pleasures and to fit the students to control nature in the service of human welfare. But the immediate or proximate aim may well be to get them to know just this particular body of facts and to acquire just this particular set of habits of thinking. A teacher of chemistry who thought vaguely of the general end of the teaching of science might well be doing far less to attain it than one who thought of the direct

purpose of teaching fifty sets of facts and forming a score of simple habits.

Their variety.

The proximate or direct or prerequisite aims of education are practically infinite in number and of very great variety. The particular changes to be made in an orphan boy, of thirteen, blind, in New York City, in order most to improve and satisfy human wants will not be the same as those to be made in a girl of eighteen, without any sense defects, living in a good home in Japan. To attain the ultimate aims best, the immediate aims may need to be varied to suit differences in sex, race, age, previous training and circumstances. To lead this boy to read Scott's novels instead of Old Sleuth's stories; to teach this girl how to sew; to root out the habit of bullying from John's make-up; to prepare this class to study medicine—these are samples of the millions of aims we have actually before us in the concrete work of education.*

A complete theory of education would give an account of every single item of all the countless changes and conditions involved in the progress from what people now are to what we wish to make them—beings with good wants which life

* It is of no consequence whether we call these changes, which are the intermediate steps between people as we find them and the desired condition of a world of people with noble wants all being satisfied, *ends* or *means*, except for the convenience of our thinking. When we think of one of them in and of itself, we shall think of it as desirable, that is, as an end or aim; when we think of it as productive of something else, we shall think of it as a means.

is satisfying for them all. It would tell just what to aim at in each stage of the education of every individual.

Such an account obviously cannot be given here. But certain of the aims that have been ranked as the most important prerequisites to the improvement and satisfaction of human wants, or even as themselves the ultimate ends of education, need at least some consideration. These are, especially, Happiness, Utility, Service, Morality, Complete Living or the Perfection of All of Each Man's Powers, Natural Development, Knowledge, Discipline, Culture and Skill. It is useful to consider the worth of each of these proposed aims as it would be judged by an impartial thinker in the light of its effect in improving and satisfying the wants of all men. For, by doing so, one can escape from any inadequate and unjust opinions which he may have absorbed from unreasoned customs, and can practice himself for testing other proposed aims rigidly by their probable effects upon the world's welfare.

CHAPTER III

THE AIMS OF EDUCATION (*concluded*)

§ 6. *Happiness*

Prejudices against happiness.

It is a paradox in educational theory that although everybody admits that the happiness of the world is an important ultimate aim, attempts to make schools minister at all directly to the happiness of scholars are often decried as undignified, 'soft pedagogy,' trifling with the serious work of education. To give them habits that will make them happy when they are forty, is allowable, even desirable, but to make them happy while they are in school is treated as a sentimental weakness.

But certainly if the direct present happiness of children does not conflict with the ultimate ends of education, it is wholly desirable, and even if it does conflict somewhat, it has a right to be put in the balance against future goods and chosen if it outweighs them. It would be the acme of wicked folly if we denied little children happiness for no purpose. And it would be a brutal consequence of adult control of education if we failed to give children their kind of happiness merely because, as adults, we did not ourselves value it as highly as their happiness when old. Yet, just this folly

and this brutal inability to appreciate values which we do not ourselves enjoy, have in the past had vast influence in deciding the character of school work, and even now are at work in many homes and class-rooms.

Happiness may be given at too great a cost, and immediate happiness alone would be a wretched substitute for a well-balanced educational aim. But immediate happiness should be one fraction of that aim. Happiness is not a fiend to be exorcised. The thwarting of every natural impulse and the deprivation of every cherished joy are not necessary means of grace. In fact, if we free ourselves from our adult tendency to think of what is good for us as adults, and consider how cheaply innocent happiness can be given to the young, and consider also that frequently (not always, of course) the childish likes and dislikes are as good guides to later welfare as our artificial prescriptions are, we shall make happiness at the time by no means a small fraction of the aim of school education.

Misunderstandings. One's own happiness is often best attained by not seeking it; happiness for others in the long run is often best attained by denying them some tempting opportunity of the moment; some causes of individual happiness are very dangerous to the happiness of all. Over-impressed by these three facts, some stern souls have declared it cheap and ignoble to emphasize

happiness as an aim of education. But what they are really objecting to is selfishness in over-weighting one's own claims to happiness and stupidity in the means taken to get happiness for all. They object to emphasizing happiness because they believe that by belittling it, mankind will get more of it.

In the days of our forefathers, when the miseries of war, famine, injury and pestilence seemed irremediable and inevitable, even the wisest men could not hope for much happiness for mankind in this world. So they urged the importance of educating man to despise happiness.

Their very spirit, however, under present conditions, makes the wise man despise an idle resignation to causes of unhappiness which modern science can control. Since victory over disease, pain and deprivation is possible by knowledge, the thing to despise is ignorance.

The apparent disagreements about happiness as an aim, then, in the main reduce to conflicts about the chances of attaining it and the relative value of present and deferred happiness. As an ultimate aim in one form or another it is accepted by all, provided it is possible of attainment.

§ 7. *Utility*

Money-price an imperfect measure of real value.

Another aim which has been often treated unjustly by educational theories and practices is Utility. It has been unfashionable, particularly in high schools and colleges, to teach anything because it has a sure utility to the world measured by a money-price. 'Bread and butter studies' is the contemptuous name which such have received.

It is true that the money-price which an act or quality of mind or body brings in the world is not a right measure of its real value to the world. For instance, the discovery of truth and the bearing of worthy children, the two things most essential to the world's welfare, are, as a rule, not paid for at all. A writer of advertisements is paid more than a poet; and a crafty trader in soap more than the best physician. But it is also true that in many cases the money-price paid is a symptom and a partial measure of real worth. The graduate who has learned nothing for which the world will pay may in a few rare cases be a great scientist or poet or social reformer, but he will far more often be a mere incompetent.

Any practical issue involving the choice or rejection of some feature of education because of its utility will be settled properly if the principles stated in the rest of this section are kept in mind.

The mere fact that the world pays a money-price for a quality is nothing *against* that quality.

But not opposed to real value.

The ability to make a really valuable invention is not less worthy of cultivation, now that there are patent-laws allowing the inventor to reap the profit, than it was when the profits fell to others. Milton's *Paradise Lost* would be the same if he had been paid ninety thousand dollars instead of ninety.

It is only because people in general are stupid, and because the great benefactors of mankind do not drive hard bargains, that the really valuable service is ill paid. It is because society at large does not know what is good for it and because scientific men do not extort what they might for their wares that society pays the inventor and advertiser of a patent medicine a hundred times more than the discoverers of the cause and prevention of yellow fever. The more rational human beings become, the more will the money-price approximate the real value, in cases where the thing can be bought and sold at all.

Utility and culture.

A contrast is also often drawn between the 'bread and butter' studies and those which give culture and refinement. This is unjust to both sides. Culture and refinement are not good because they are the marks of an idler—of one who does not share in the world's productive labor. They have a far different warrant from that. Much less are the bread and butter studies bad because they are for the great

majority, the toilers, those whose talents and opportunities do not suffice to win them an easy or bountiful living. It is just because the bread and butter studies make the struggle for bare existence less intense and exacting and dull that their value is real and great. It is, moreover, precisely by their aid that those who would otherwise be unskilled slaves to daily necessity are given some chance for culture and refinement.

Another unwise contrast is that between certain forms of education commonly called utilitarian, such as instruction in agriculture, in trades and industries or in the technical and scientific professions, on the one hand, and certain forms of education commonly called non-utilitarian or cultural, such as the study of the classical and modern languages in high schools, or the courses in art, music and manners in girls' boarding-schools. To *call* a thing utilitarian or non-utilitarian does not make it so. The study of agriculture may demand and foster as intellectual interests as does the study of poetry. That the individual earns his living by it may be a minor matter. The scientific professions need be no more subdued to dollars and cents than the profession of literary man or painter. The languages of the high school are very often out-and-out utilitarian, namely, in cases where the method of earning a livelihood—for instance, teaching—demands a high-school graduation. The art and music and manners of the finishing school are in-

tended precisely to get the girl such a livelihood as her social class requires by getting her a husband.

The proper meaning of utility as an aim.

The best arguments alleged for suspicion of money-paid results from education are:—First, people may be more or less trusted to get without special care from schools that which will bring a money-price; consequently the schools may better give their energy to other aims. Second, the things done for a money-price are not so good as those done for certain other motives.

There is a truth at the basis of each of these arguments. A school should do more than give the world what the majority of men already want and are ready to pay for. It should improve as well as satisfy their wants, and should be more far-sighted and unerring in its opinions of what will satisfy their wants than men in general are. In the case of the first argument, however, it must be noted that experience has again and again proved that what is left to private enterprise in education will be done for somebody's private advantage rather than for the public weal. People may be trusted to try to get what education they need to secure a money reward, but they may also be trusted to blunder, to be cheated and to pursue short-sighted policies, in many such cases. Boys and girls need the help of schools to be taught even in cases where it is to their selfish pecuniary advantage to learn.

Of the other reason for suspicion, it may be said that it is a reason for suspicion only, not for rejection. What is needed is discrimination. We would *not* teach clever methods of adulteration in a trade-school for grocers' clerks: we *would* teach methods of keeping food-stuffs fresh and free from dirt. In both cases the knowledge would bring a money-price. In the latter it would also be of real value to the world at large.

The one best reason for a frank acceptance of training for wage-earning as an aim of the schools is that for a large number of children the possibility of being a great benefactor of humanity, as teacher, physician, moral leader, or the like, is *nil*. The kinds of work which they can do are limited to the kinds for which the world does pay. If one restricted their education to preparation for the loftier vocations, where the money-price is not the motive or the measure of the service, one would be giving them an education unfitted to their capacities and to what the world needs of them.

To sum up the whole matter of education for wage-earning, one might say, "The aim of education is not to fit people to get a living, but to fit them to live. Fitting them to get a living is, however, one part of fitting them to live. For many pupils it is a large part."

§ 8. *Service*

The dignity of useful service.

It is a shame that the word *utility* should have been so constantly used as a synonym for 'useful in the common sense,' 'exchangeable for a money-price.' For in its other sense, as the opposite of uselessness, it describes one of the most important aims of school education. The word now used instead of utility to give this meaning of 'not wasteful,' 'giving somebody something he needs,' is *Service*. When we mean that education should aim to make people useful in this wide sense, we nowadays say that education 'should fit them for service.'

The worst error that is at all commonly made about the aim of education is to regard it as a means of putting one in a position where others have to work for him, and he not for others. That in the past 'the better classes' should have been in many mouths a name for those who do little and receive much is a sad commentary on the lack of rationality and justice in human life. The parent to whom the school is primarily a means of giving his children an advantage over others from whom their superior training enables them to exact service without equal return, absolutely misconceives the aim of public education. What we ought to master is the forces of nature, not our fellow-men. With them we should cooperate.

We should make use of nature and be useful to men. The ideal life is one of work and recreation both enjoyed; the successful man is happy in his work and wants it. Only an immoral and perverse education puts anybody above labor.

Varieties of service. What service people shall be educated to perform is a less easy question. What seems to be of service may, in the long run, be a waste. What seems like indulgence may turn out to be of the utmost value. Joseph Henry's experimenting with electric currents probably seemed to many of the hard-headed men of his day a display of useless scholarship, or even a self-indulgence in intellectual play; but the results of his intellectual play are now every day replacing the manual labor of hundreds of thousands of men. Education for service makes one think of teaching pupils to work and to be expert in some profession or trade; but perhaps the best education of children for service would be healthy play in the open air, and the practice of right habits of eating, sleeping and avoiding weakening diseases. Teaching girls to build a fire will seem highly serviceable to most of my readers, but if we should all come to use only electric stoves, it might be as purely academic a feat as parsing Latin sentences!

What will be an education for service for one person may be for waste in the case of another. Chopping wood ten hours a day would be a crime

for a boy who might be an expert electrical engineer. For one child, the most useful life may be as the administrator of the fortune he inherits. His brother may be a pauper living at the expense of his parents unless he works at some simple manual labor. Education must prepare all men for mutual aid, each to cooperate in the way that he best can.

§ 9. *Morality*

Morality in the broad sense is simply such thought and action as promote the improvement and satisfaction of human wants. The 'right' thing to do in any case is the thing which a man who could foresee all the consequences of all acts, and who considered fairly the welfare of all men, would in that case choose. The aims of education as a whole are identical with those of morality.

Usefulness or service is one great feature of morality. The substitution of the impersonal pleasures for the proprietary pleasures and for the still more selfish and gross forms of indulgence, is another. So far as it can properly do so, the school should give time and energy to morality in the narrower sense of the cultivation of the good will, and of all the specific habits of performing right actions, such as honesty, courage, or cleanliness, and of avoiding wrong ones, such as cruelty and injustice.

So long, however, as the school has only very

partial control over pupils' lives, and for a limited time, so long as it can provide only one teacher for thirty or forty taught, and so long as it has so many other things to do, it must be expected to assume less responsibility than the home for many of these attitudes and habits. It would, in fact, be presumptuous for any institution to expect, not only to inform a child's mind, but also to remake his conduct—at an expense of twenty-five or thirty dollars a year!

The responsibility of the school.

In so far as the school is given the facilities—in so far as it becomes social settlement, employment bureau, mother's helper, institutional church and the like—in so far it should increasingly aim to control the pupil's future in matters of conduct directly as well as by control of his intellect, tastes and general work in life.

The aim should be to develop positive rather than negative morality, the presence of actual good works rather than the absence of wrongdoing. It is better for the school to teach a boy to earn money honestly than merely not to steal; better to teach him to plant a school garden and tend it than merely not to cut his initials on his desk; better to teach him to help younger children with their work and play than merely not to tease them. It is what the school gets boys and girls to do, not what it keeps them from doing, that counts most for morality.

§ 10. *Perfectionism*

A generation ago one of the most popular statements of the aim of education was 'The Perfection of All One's Powers,' or, in Herbert Spencer's words, 'Complete Living.' These statements always needed qualification. For it is not desirable that life should complete itself by having all possible varieties of envy, jealousy and cruelty; and it is certain that some features of the life-process are more desirable than others. Completeness had to be interpreted as the fulfillment of certain selected features which could work together *harmoniously,*—that is, without sacrificing worthy wants. Obviously, no one would advocate perfecting the power to worry or despair. Since certain powers conflict with others, it was necessary to change the phrasing to 'harmonious development' or the like.

Vague and inadequate as a complete aim.

Specialization is necessary.

But even if the misleading of 'complete' and the vagueness of 'perfection' are prevented by qualifying statements, the doctrine itself—that education's business is to make the best possible specimen of humanity out of each man—is faulty. The aim of life is not to stock the world as a museum with perfected specimens for man or deity to contemplate. It is to make them all together an organized force for

the welfare of the group. Powers are not for possession and display, but for use. This requires specialization rather than general perfection. Men have to live together and depend one upon another, not each trying to be the best possible creature in all ways, but each being taught to perform, and take pleasure in, those services which it is for the common good that he should excel in. Nor is it desirable, even from the point of view of individuals taken singly, that education should develop every man in all virtues. Each individual, by sex, race, hereditary equipment and the circumstances of time and place in which he is born, is made likely to meet certain situations rather than others during life, and it is to be competent and happy in those situations that he particularly needs to be taught. It would be wasteful to train the Jews and the Negroes identically. It would have been stupid to have perfected Pasteur's powers to drive a good bargain, or Darwin's powers as a public speaker, or Aristotle's powers as a gardener. Perfecting the power to shoot with bow and arrow is unimportant in America now for the same reason that it was important four hundred years ago.

The doctrine of individual perfection is inadequate because it gives an excuse for the too common tendency of men to educate themselves for competitive display instead of cooperative work, because it opposes the specialization which is

necessary for mutual aid, and because it neglects the fact that education beyond certain fundamentals should narrow itself to fit any given man for a certain probable course of life, not for all life's possibilities.

And will be more so in the future. Perfectionism of individuals, one at a time, grows less significant as an aim in proportion as more knowledge is discovered, as the world's work is more divided, and as education is for a wider group. Even to-day such an ideal for the education of the three quarters of a million children in New York City's schools seems a little absurd. Many of them early show special talents to which it is for the common good and their personal happiness that other powers should be sacrificed. Most of them have some weakness which it would be folly to try to remedy. Efficiency in service grows more significant as we see more clearly the world's needs and how to meet them. Not long ago the best a man could do for the world was to *be* the best possible man himself and then do what he felt like doing. This is still true enough to leave a solid foundation for the perfectionist aim; but every decade it becomes more possible for a special line of action to be chosen beforehand for an individual with a very high probability that, if he prepares himself properly, he will by that career be of sure value to himself and to the world.

§ 11. *Natural Development*

The causation of changes in a man's intellect and character from infancy on may be divided between the forces of growth from within and the forces of nurture from without. Some theorists have been prone to regard the inner growth as all desirable, and the nurture from without as unwarranted interference. Nature, they say, is surely right; man's attempts to improve on nature are likely to be wrong. The aim of education, they think, is identical with the end-result of unaided and unchecked natural evolution; *what would be* if the inner springs of development were left to fulfill their course, *is what ought to be*—the best that can be.

Such doctrines of the superiority of the unlearned to the learned, of the products of nature to the products of human control over nature, of the inner impulsion to the outer direction, may be useful as rebukes to the neglect of man's original endowments and to an over-puritanic distrust of nature. They did, as a matter of history, go with a more humane and sympathetic allowance for the inborn tendencies of childhood. But they are so obviously wrong as general theories of the aim of education, that even their strongest supporters always abandon them in practice.

Their logical consequence for practice would be the abandonment of all education. The inner impulses should be left alone. If human control

over nature is mischievous, it should retire from the field. Arranging some automatic equivalent for manna, the rising generation should be left to grow up undisturbed by houses, books, tools, the example or advice of their elders and all other products of human art! The result of such confidence in natural development alone can be predicted with surety. It would be no Eden of happy innocence and active intellectual advance, but a return to the brutishness of the human race some hundred thousand years ago.

So in practice these theories always become little more than a protest against forcing the results of civilization upon children too rapidly and against neglecting the instincts and capacities present as a gift from nature upon which any wise education must build. Such a protest is valuable. The perpetuation and satisfaction of the worthy wants in man's inborn equipment are as desirable as the creation of new ones.

§ 12. *Knowledge*

In the work of making use of the forces and laws of nature to satisfy human wants, the main —almost the only—cause of success is knowledge of natural forces and laws. In the work of improving our own wants an important cause of success is knowledge of the forces and laws of human nature.

So it is one great aim of all education, and the

special aim assigned by society to school education, to increase the sum of knowledge, to put all men in possession of it, each in possession of those portions which it is best for the common weal for him to know, and to teach each man to apply this knowledge to the conduct of life.

Knowledge of how to use knowledge.

Knowledge should not be given for display, nor to gratify the craving for personal superiority, but for use. It should be given in such arrangements that the separate items of it will work together, not as a pedantic jumble. But it is no proper criticism of knowledge as an aim of education to show the faults of selfish culture or pedantry. Knowledge itself is the cure for whatever evils knowledge causes; for others it is not to blame. If mean men are unwilling, and stupid men are unable, to use knowledge for welfare, the defect is not in knowledge.

Knowledge *versus* power.

Doubling one's power to get and to use knowledge is doubtless worth far more than doubling one's knowledge. Knowing how to study is, in this sense, better than knowing other facts; and knowing how to apply all the knowledge one has is, in this sense, better than having more. But the contrast in words implies an opposition that may not really exist. One certainly rarely loses in intellectual power by getting knowledge. Indeed, an excellent rule for study is 'So study that you get knowledge,' and an excellent means to gain power in applying facts is

to learn some other facts about them. The opposition is really between haphazard, unrelated, verbal knowledge of details and selective, ordered, applicable knowledge of principles. The facts really contrasted are the inferior and the superior varieties of knowledge, or the inferior and superior varieties of intellectual power.

The superior varieties are better to get when they can be got equally well. Unfortunately they rarely can. They demand superior original capacity or vastly more time; and education, at the best, has often to be contented with giving detailed, piecemeal knowledge, knowing that full use of it will not be made. It is often a case of choosing half the loaf.

The increase of knowledge. The sum of knowledge of nature and of man is increased directly by the intellectual labor of a few exceptionally gifted men and women. Probably not one in a hundred of the pupils who enter our schools could, even with the most advantageous training, discover new truth—add to the world's intellectual capital. But the work of the one in a hundred, or in a hundred thousand, means an enrichment of the world, a higher percentage of satisfied wants, for ever after. To discover such a one, to prepare him to do the work and to give him the opportunity to do it, is an important aim of education—as important, perhaps, as the diffusion of knowledge among a thousand others.

The early diagnosis of the capacity to advance

knowledge, and the preparation of individuals possessing it for their proper work in spite of the accidents of poverty, lack of appreciation and lack of stimulus, can be managed better by the school than by any other agency and should be a recognized aim of school education.

It may be asserted that this capacity may be trusted to display itself and make its own way and find its own reward. But the assertion is as false as it is true. We may trust that great capacity will do its work for the world with half a chance, but we may also trust that it will do more or better work with a full chance and that our efforts may occasionally rescue a fine ability from not having any chance. Nothing is more irrational in education than for schools to do nothing where a fair amount is done without effort on our part. It is just in those cases where much is given already that our more is most fruitful. A fine capacity gets along to some extent without education's help, but at the same time education is most profitable of all when spent upon a fine capacity.

The diffusion of knowledge. Once discovered, knowledge is relatively easily transmitted. That coal will probably be found in certain rocks, and that it gives heat by burning, can be easily learned by many after some one person knows it. That boiling water will destroy its power to give the drinker typhoid fever is now learnable by almost any one, though millions upon millions of men

were unable to discover the fact. So, though the discovery of truth is perhaps the more useful, its diffusion is a much more frequent aim.

It is only by ignorance or forgetfulness of what man owes to the knowledge thus given to him that any one can resist a holy enthusiasm in the spread of knowledge. Consider the miseries removed and satisfactions created by the spread of one small fraction of knowledge—preventive medicine—to one small group of men! Cholera, smallpox and the plague are thereby exterminated. The end of yellow fever, malaria and tuberculosis in a country becomes simply a matter of dollars and cents. Deaths from wounds, child-birth and minor surgical operations dwindle to rarities. Consider the fears and suffering that have been undergone on account of purely imaginary goods and evils, whose tyranny over human happiness mere knowledge removes! Ghosts, evil spirits, witches and demons made the life of many primitive peoples an almost incessant fear, and took tithes in labor and goods that could have added a large increment to human comforts.

Morality itself, though often contrasted with or set apart from knowledge, is, except for the good will and certain other noble and humane qualities of character and temperament, a creation of knowledge. It is chiefly knowledge that saves the mother of to-day from throwing her baby to an idol, the consumptive from poisoning his neighbors, or the ruler from ruining his

country. Many of the greatest disasters have been innocent in intent.

It is because we are so used to their benefits, that we fail to note the magnificence of the gift by schools in the mere knowledge of reading, measuring, computing, physics, chemistry, botany, engineering, medicine and the like. If they did nothing but give this knowledge, they would still be the best investment for welfare that man has yet found.

The distribution of knowledge. Not all knowledge can be given to all men. Who should have this or that fact in his possession is to be decided by what *he* can do with it for the improvement and satisfaction of his own and other men's wants. Many men need to know how to read, count and keep clean; very few need to know the names of the Pharaohs in order, or the distance of Sirius from Arcturus. It would be wasteful for a man of a certain original nature and training to be taught to manipulate logarithms, and still more wasteful for a man of a certain other nature and training not to be. Here, as everywhere, the material—that is, the persons to be educated—decide in part what the proximate aims of education should be.

Reason has thus a very complex and exacting problem in distributing knowledge so that it will do the most service. The final answer to the problem can come only from elaborate and ingenious study. But some common blunders may

be noted here. The first, which may be called the error of *unreasoning zeal,* is to try to distribute whatever knowledge one possesses to whomever one meets. Some teachers, notably young men and women fresh from successful study of some special group of facts, try to produce duplicates of their knowledge in all their students. Such zeal, though in many ways a fine and useful impulse, is necessarily wasteful.

The second, which may be called the error of *inertia,* is to continue the wide distribution of certain facts long after more serviceable facts are at hand. Thus the problems of digging wells and building stone walls are retained throughout the schools of a community like the city of New York or the State of Massachusetts, though perhaps not one in a thousand of the children will ever meet them again. So also the simple facts of the causation of disease by bacilli and protozoa and their prevention by simple sanitary measures have not yet wrested space from the far less instructive anatomy, physiology and dietetics of elementary text-books on health.

The third, which may be called the error of *imitation,* is to add to the course of study more and more of the same sort of thing rather than some more desirable knowledge of a different sort. Thus, when the length of schooling was quadrupled, more and more arithmetic or pseudo-arithmetic was added to the course of study, though other knowledge was clearly of more

value than the manipulations of greatest common divisor, least common multiple, square root, cube root and proportion, or the definitions of brokerage, taxes and bank discount.

The fourth, which may be called the error of *puritanism,* is to prefer for any individual the varieties of knowledge which he by nature avoids, the doctrine being that what knowledge interests him he will get by himself. Experience has proved that, with certain exceptions, the distribution of knowledge in accordance with interest is the better plan.

§ 13. *Mental Discipline*

The notion of mental discipline has to be considered in connection with the nature of the persons to be educated and with the means and methods used as well as in connection with the aims of education, and cannot be treated fully at this point. The term is also used in many ways, of which I shall take only the most instructive one. As an aim, mental discipline is best used to mean the increase of a person's *general* powers to respond well in thought and action and feeling. It is thus contrasted with particular knowledge, particular powers, particular skill, particular desires and aversions, and the like. If we contrast a general faculty of reasoning with particular powers of inference about geometrical facts or linguistic facts or botanical facts—if we contrast a

general power to attend with particular habits of attention to books, class-room instruction or professional tasks—we may call the improvement of the former in each case a gain in general mental discipline and the latter a gain in special habits. Other things being equal, the former will obviously be better worth aiming at than the latter.

A more instructive way to put the issue is to consider intellectual and moral life as the operation of a series of abilities, or functions, or tendencies to respond to certain situations so as to attain certain ends, and to consider further the relations of these functions. For example, consider the following:—

a. The ability to add 9 and 8. The ability to add 4 and 5.
b. The ability to add 39 and 8. The ability to add 4 and 65.
c. The ability to add integers.
d. The ability to add common and decimal fractions and integers.
e. The ability to add algebraically.
f. The ability to add.
g. The ability to compute.
h. The ability to be accurate in all numerical thinking.
i. The ability to be accurate in all thinking.

There is in this case a hierarchy of abilities, the latter ones including the former. A teacher

who secured only the abilities *a*, *b* and *c* might be said to be a retail teacher. One who, by some magic, could once for all get *h* or *i*, might be called a wholesale teacher.

Now the doctrine that mental discipline should be a prominent aim means substantially that education should aim at getting mental abilities wholesale, in large lots, by discovering some essential element that is in many of them and teaching that *par excellence*. It is a doctrine of expediency, declaring, for example, that to improve the general ability to be accurate in all thinking by even so little as one tenth of one per cent. would be better than to improve the ability to add integers alone by a hundred per cent. This is, of course, true. For life offers many thousand times as many chances to be accurate in one way or another as it offers to be accurate in adding integers. Suppose that, by one method of teaching column addition, a teacher could improve general accuracy a tenth of one per cent., and by another, requiring the same time and energy, he could improve general accuracy only a twentieth of one per cent. Then, even if the second method was ten times as effective for addition itself, the former would be far preferable, for a gain of .0005 in accuracy in everything would doubtless more than balance a gain of 10.0000 in addition of integers alone.

This argument is weakened somewhat in proportion as education knows beforehand the career

probable for any child. For, in such cases, general accuracy, or attentiveness, or ability to reason, would not have its full value. If one knew that a boy was to be an accountant, accuracy in writing a history of Japan, or playing the violin, or in making even stitches, might well be sacrificed to accuracy with numerical data alone. But the expediency, as a general rule, of aiming at improving the features common to many abilities rather than those confined to a few is self-evident, provided other things are equal. That is the truth for which mental discipline as an educational aim should stand.

§ 14. *Culture*

Every educated person thinks he knows what culture means—and commonly thinks that he has it! But there would be great variation in such opinions and possessions.

Its many meanings.

To some it means a body of knowledge and habits which distinguishes its possessor as a member of the leisure class, ornaments his intellect much as tailor-made clothes adorn his body, and satisfies chiefly the craving to display one's superiority to others. In this sense it is a conventional ornament, much less obnoxious to the democratic spirit than outriders, diamonds and certain other testimonials to freedom from productive labor, but not fit for emphasis as an aim of education.

To others it means knowledge of human affairs

contrasted with science and technology, which are taken to be the knowledge of things. Thus history, literature, the fine arts, psychology, sociology and government would often be regarded as much more cultural than physics, chemistry and geology. There is, however, nothing but confusion to be got from such an application of the word. To others it means the study of rather pleasant concrete details contrasted with 'discipline,' the rather severe training in general principles. Thus many would think of learning the names of the stars, collecting flowers and translating Vergil as more cultural than working out mathematical astronomy, comparative anatomy or the theory of the Greek moods and tenses. According to another common notion, culture is knowledge and appreciation of what is beautiful and fine. Such knowledge, which is one of the chief impersonal pleasures, is, of course, one fraction of the total aim of education. According to another common notion, culture is a body of knowledge and habits and interests such as prepares a man to perform, not the special work of any trade or profession, but the general work of citizen, parent, friend and human being. 'Culture' is thus a name for the broad knowledge useful for being a man or woman in general, as opposed to 'technical training' for being a physician, carpenter, chemist or statesman. Culture in this sense is a very large fraction of the total aim of education.

If the word is to be retained in educational discussions at all, it should perhaps be defined as training for the impersonal pleasures —the unselfish satisfactions which involve no necessary deprivation for any other man. We need some term to include these equitable, stainless wants—appreciation of beauty in nature and art, the observer's interest in human life, the sense of humor, knowledge, joy in getting and giving it, and the rest—whose increase was seen to be one main element of the aim of education. If 'Culture' could be relieved of its connections with display, uselessness, lack of disciplinary value and lack of scientific solidity, and used simply as the name for the gratifications which in no wise deprive, it would mean to all what it doubtless does mean to its wise advocates.

Its best definition.

§ 15. *Skill*

No one would assert that skill is the total aim, and no one would deny that it is a fraction of the aim, of education. The chief facts about it which are likely to pass unnoticed are:—its appropriateness where the effort to give knowledge is relatively wasteful, and its service as an impersonal pleasure. Skill, as in the trades or household arts, can be got, even in high degree, by boys and girls who, by lack of capacity or interest or both, can get little knowledge of general principles. So, in proportion as schools are at-

tended by a wider and wider selection and retain the unscholarly types till sixteen or eighteen instead of till twelve or fourteen, skill becomes properly a larger and larger factor in their proximate aims. Skill may also be, for almost all individuals to some extent, and for some sorts of individuals to a very great extent, a source of impersonal pleasure. The taste for workmanship—the impulse to do the job as it should be done—making a first-rate product by fit means—is one of the most easily developed, but also one of the best, virtues. It is commonly more truly cultural or refining than an interest in correct manners, speech, or opinions about the fine arts, because it is commonly more sincere and less tainted with ostentation.

§ 16. *Custom versus Reason in the Choice of Aims*

In the choice of educational aims and in the interpretation of happiness, morality, culture and other words describing them, there is an incessant warfare between custom and reason. Custom—the human activities which we are bred into by 'use and wont'—is strong because man tends to be comfortable in doing and thinking as he has done. Breaking habits is even harder for a nation than for an individual, because all the men of the nation can rarely be stirred to act together. Moreover, the men and women in power are the

older generation to whom the custom is endeared by long familiarity. Reason—the decisions that are made impartially in view of all the facts obtainable—may, and sometimes does, justify the customs of use and wont, but it is no respecter of custom for custom's sake, and often rejects an educational aim of long standing. Since the world is now so rapidly changing, customary aims, even if suitable when they originated, may soon become unreasonable. So criticism of tradition in the light of reason is always necessary.

Tradition and custom are untrustworthy.

The mere fact that 'everybody' is agreed that education should do this or that is then no guarantee. 'Everybody' is often wrong. 'Everybody' was agreed a hundred years ago that the aims of education for women were simply and solely to make them competent managers of cooking, preserving, spinning, weaving, entertaining and the like, and that it would be wrong to educate them in the sciences, arts and professions. 'Everybody' was agreed two hundred years ago that the aims of education were to teach boys who inherited wealth and power to live up to the traditional notion of a gentleman, and to teach boys who were born in poverty and serfdom to live down to the traditional notion of a workingman. Men who wished to enjoy the privileges which chance or their ancestors gave them invented the useful doctrine that God had called them to the state of leisure and power and had called those others to drudge

and obey. None believed this doctrine more steadfastly than those who suffered most from it.

Against such customary aims, reason, seeing things as they are and weighing the wants of all men impartially in terms of the common good, has fought and is winning. Its long conflicts have taught it a wise distrust of those educational aims of the past which have been preserved by sheer inertia or by the selfish zeal of those who unfairly profited by them. Reason makes war equally on mere novelty, mere change, mere disturbance of customs; but from such fanaticism of careless radicals in education it has less to fear.

Samples of custom's errors.

Two of the most suspicious relics of past customs in the educational aims of to-day are the glorification of the ornamental and the misinterpretation of excellence as the possession of advantages over other men.

Ostentation.

As a matter of custom, the activities of the leisure classes have always been devoted in large measure to showing that they were leisure classes. They have spent enormous sums of money just to show that they had money to spend. They have worked hard to acquire useless accomplishments so as to make it clear that they did not need to work at all! They educated their children in large measure with the aim of displaying to an envious and admiring world that their children did not need to be of any use. Now we have tended to ape the

leisure classes in education as in everything else, and so to retain, under the excusing pretense of falsely defined 'culture' or 'discipline' or 'knowledge,' the aim of sheer uselessness for display's sake.

Relative superiority. The ordinary man does not much appreciate the welfare which he has or the improvement which he makes, in and for itself. As has been noted, he wants rather to be better off than some of those about him or to make an advance beyond some one who is now ahead. The work of men in business, women in the home and children in schools is too commonly to do, not what will make them better off than they were before, but what will make them better off than their rivals. The most frequent race in life has been to get ahead of somebody rather than to get ahead in and for itself. The common interpretation of excellence is excelling another, leaving him below or behind. Now this custom of judging by relative superiority has been carried over from the individual's struggle for advancement to the notions of the aims of public education. But it is meaningless there. It makes no difference to the world *who* is the most gifted one of ten million children—who gains most, next, third and least. To the world the only matter of importance is that the gains should be great. The race of civilization and welfare is not run to see who can go furthest, but to make all go as far as may be.

CHAPTER IV

The Material for Education: General Facts and Laws

The aim of education is, we have seen, to change human beings for the better, so that they will have more humane and useful wants and be more able to satisfy them. Human individuals, especially the young, are the material for education; and knowledge of human nature is necessary if educational changes are to be made economically, securely and without secondary ill effects.

Education and the sciences of human nature

For this knowledge of the material which it works upon and which it aims to change into nobler and happier natures, education has recourse to physiology, psychology, sociology and all the other sciences of man, and to whatever facts concerning the production and prevention of changes in human nature educational experience itself has demonstrated. Nothing human should be alien to the student of education, though he will be specially interested in:—first, the original nature of man, the tendencies which human beings have apart from all education, and second, the general laws of learning, the ways in

which men's original tendencies are modified. He will also be more interested in man's intellectual and moral nature than in his physical or chemical nature, since the former is more amenable to education and changes in it are, as a rule, more valuable for human welfare.

Many volumes larger than this would not suffice to report the knowledge of human nature that is relevant to education. The psychology of a single ten-year-old boy would probably involve as much subject-matter for investigation as the astronomy of the solar system or the geology of a continent. And although biology, anthropology, psychology and sociology are but in their beginnings, they have already far more information to offer students of education than even a gifted thinker could master in many years. I shall try simply to introduce the reader to the spirit and some of the results of scientific studies of the material upon which education works.*

§ 17. *Situation and Response as the Elements in Human Behavior*

The total state of affairs by which an animal is at any given time influenced is called the stimulus

* The reader may well combine with the necessarily superficial introduction given here, a study of a sample topic, using, say, one of the following:—*How We Think,* by J. Dewey; *Mental Discipline,* by W. H. Heck; *The Psychology and Pedagogy of Reading,* by E. B. Huey; *Individuality,* by E. L. Thorndike.

or 'situation.' What he thinks or feels or does, as a result of this total state of affairs acting upon his nature, is called his total reaction or 'response' to it. Thus, to the situation of being in such and such a place, so light, so warm, with such and such walls and furniture around him, such and such clothes upon him, and these words before his eyes, the reader responds by:—sitting still; moving and stopping his eyes so as to get an adequate reading impression from the words; knowing their meaning; continuing to live, breathe, digest and grow; and by many other minor processes of body and mind. If one were to be exact, the situation or total state of affairs acting upon a human being would have to be defined as all the universe at that moment save him. For, directly or indirectly, it all might count in determining his response. But for ordinary purposes it is allowable to leave out of consideration those features—such as the movement of Sirius, the temperature of Mars, the birth of an earthworm miles away, and the like—which have no appreciable effect on him. To be exact one would also need to bear in mind that one situation does not come, cause its response, and then be followed by another separate one, making an S1—R1, S2—R2, S3—R3, order, but that the situations come as the continuous flow of a stream and that the responses bloom out side by side or overlapping, as well as one by one in distinct sequence. But it is useful

Situation and response defined.

for science to abstract out definable fragments of a human life and consider them one by one, each in connection with the situation which is its antecedent.

It is even more useful to analyze out some *element* of the total situation and ascertain what element of the response is due to it, or to seek what features must be present in a situation to ensure the production of a certain element in the total response. Thus one asks what the response of an animal to a stern look, or to a small object running away, or to the problem '$3/4 \div 7/8 = ?$' on a blackboard, will be, irrespective of the other concomitant features of the situation. Or one seeks some elements which will produce responses of attentiveness to the teacher, or memory of the meaning of *Arma virumque*, or writing 'cat' legibly, without special interest in what other effects may be produced by other accompaniments of these elements.

The use of these two terms.

A man's life may then be considered as a series of situations or states of affairs which act upon him and a series of responses of thought, feeling or action which he makes to these situations. His response in each case changes the situation, or changes him, or does both. Any fact about human nature may then be put in the form, "To the situation *xyz*, individual *a* will respond by ABC." Any problem of education may be put in the form:—"Given a certain desired change in a man, what

situation shall we create to produce it, either directly or by the response which it provokes from him?"

Their value for thought and practice.

There are two reasons why a student of education should think of human life in terms of a series of responses to a series of situations. The terms economize thought in the sciences of man somewhat as the terms 'cause' and 'effect' do in the sciences of things.* They also lead to two very simple but also very useful laws for educational theory and practice. These are:—

1. Consider any situation before letting it act upon a pupil.

2. Consider the response which is desired, before devising a situation to evoke it.

More briefly:—

1. Know what the situation is which confronts the pupil.

2. Know what the response is which you wish to secure.

Consider the situation.

What these rules mean and that teachers need to use them will both be seen best by means of cases where they were *not* followed. The following are samples of the frequent neglect of the first rule:—A favorite method of teaching spelling years ago was to

* The situation, if taken together with the nature of the individual concerned, may be thought of as the cause; the response, if taken together with the change in the outside world, may be thought of as the effect.

have passages like the one below copied with the misspellings corrected. The notion was that the pupil would think of the correct spelling and write it and thereby learn it.

If Hope be a star that would leed us astray,
And "deceiveth the heart," as the aged ones
 preech,
Yet 't was mercy that gave it to beakon our way,
Tho' its halo ilumes where we never may reach.
Tho' friendship but flitt like a metior gleem,
Tho' it bursts like a morn-light buble of dew,
Tho' it passes away like a lief on the streem,
Yet 't is bliss while we fancy the vizion is true.

The method was a bad one and should not have been acceptable to anybody who considered what situation thereby confronted the pupil. He was put face to face with strangely seductive misspellings which could not but make a strong impression upon him while he examined them to puzzle out what the words were, and even while he was trying to think what the correct spellings might be.

In arguing for written rather than oral quizzes it has been assumed that the issue is solely between the saving of time for the class when all are tested together and the expense of time for the teacher who must correct the papers. But at least two elements of the situation of great importance are overlooked by this assumption.

Recitation by other pupils makes the class hour sociable and so interesting, especially for children under fifteen. The presence of the other pupils as listeners when one recites is a strong stimulus to achievement. For many pupils the desire to appear well before their classmates outweighs the desire to satisfy the teacher. Even graduate students in universities will in many cases confess that the absence of a definite showing of their knowledge before their peers in the classroom removes a strong motive for study.

Consider what response is desired.

Since to know what response you seek to secure means substantially to know what you are trying to teach the pupil, it might seem too obvious a rule to be stated. But the fact is that we all tend to accept some vague verbal idea of what we are trying to teach pupils and by no means always think out just what response is to be sought. If we did, we should not make such mistakes as to suffer pupils to learn to say a rule instead of to apply it, or to spell words which they will never use in writing,* or to teach 'carrying' in addition by a series of examples in which the number to be

* Even our best present practice does not apply these simple rules. The spelling drills of a city commended for its superior wisdom in the teaching of spelling include in the case of the seventh and eighth grades such words as seraphs, valvular, guttural and promiscuous. The few children who need to know how to spell such words may best be left to learn them in the course of reading. The time should be spent on responses which there is some probability that the majority of the pupils will be called upon to make.

carried is always *one.** The fact that people do think vaguely and verbally of teaching 'grammar' or 'spelling' or 'addition with carrying,' instead of realistically in terms of what the pupil is actually to be able to think and do, accounts for a large fraction of futile teaching. The first step in raising one's educational activities out of the bog of unintelligent imitations of current customs to the level where reason can control them,

* The result of using exclusively such examples as

		16	12
12	28	31	17
49	14	24	23
24	17	13	41
—	—	—	—

is that pupils form the bad habit of adding *one* to the second column, instead of adding the required number of tens, whatever it may be. The reason that would be assigned for using at first examples with only *one* to be carried, and later examples with *two* or *three* to be carried, is presumably that the graded set of responses is easier than those requisite when carrying with *one, two,* or *three* to be carried is taught at the start. But this is very doubtful. If the first examples in carrying were such as

					16
	16		17		18
38	28	14	39	43	14
27	35	35	29	17	19
19	17	26	18	32	17
—	—	—	—	—	—

the pupil would be led to think of 'carrying *versus* not carrying,' because he would be led to think of *what* to carry. The responses that express the habit, '*10 or more,—I carry 1 if it is 10–19, 2 if it is 20–29, 3 if it is 30–39,*' may be formed with not much greater difficulty than those expressing the habit, '*10 or more,—I carry 1 if it is 10–19.*' And after the habit of carrying 1 is formed, the habit of carrying 2 or 3 appropriately is nearly as hard to form as the total correct habit.

is to form the two habits of knowing the situation which the pupil is responding to and knowing the response which it is desirable to have him make.

§ 18. *Intellect and Character Are Due to Intelligible Causes*

Human nature is intelligible.

No response of any human being occurs without some possibly discoverable cause; and no situation exists whose effect could not with sufficient knowledge be predicted. Things do not happen by mere chance in human life any more than in the fall of an apple or in an eclipse of the moon. The same situation acting on the same individual will produce, always and inevitably, the same response. If on different occasions it *seems* to produce different responses, it is because the individual has changed in the meantime and is not the same creature that he was. At the bottom of the endless variety of human nature and circumstance there are laws which act invariably and make possible the control of human education and progress by reason. So the general rule of reason applies to education: *To produce a desired effect, find its cause and put that in action.*

Its management requires insight, not chance impulses.

This rule, too, may seem obvious and commonplace. In truth, however, a very great amount of educational effort has been and is haphazard, the result of whatever impulses the educator by nature and habit has in each particular emer-

gency rather than the result of a rational plan to produce a certain change by the most probably available causes. Thus, if a child repeatedly fails to understand a statement or enact an order, the parent will often repeat the identical statement or order but in a very loud voice, even though the use of reason would have shown that the child heard the words perfectly. And when this addition of more intensity fails, the parent often adds still more, confusion and terror being the response in the child. By nature and previous habit the parent *feels* like yelling the words that have been misunderstood, as a man feels like shaking his fist at the rain that is spoiling his crops.

The commonest error of the gifted scholar, inexperienced in teaching, is to expect pupils to know what they have been told. But telling is not teaching. The expression of the facts that are in one's mind is a natural impulse when one wishes others to know these facts, just as to cuddle and pat a sick child is a natural impulse. But telling a fact to a child may not cure his ignorance of it any more than patting him will cure his scarlet fever.

Human nature in general is so complex and so little known, and human individuals are so various in their natures and change so much and so subtly, from day to day, that one is tempted to give up the effort to understand them and adopt aimlessly whatever treatment he happens to feel like using. Even superior teachers would have

to confess that again and again they say this or ask that or order the other, not because they know any good reason why the statement, question or command should produce the desired response, but just because they do not know what to do and because that particular statement or question happens to come to mind. To thus act with no reason may, under certain circumstances, be excusable, but such teaching by the push of instinct or pull of chance is essentially irrational and inferior. There is always a reason for every fact in human behavior. There is, for every emergency, something which is better to do than something else; and there should be always a better guide than one's haphazard impulses.

The practical consequence of the fact that human nature and behavior are knowable, the same effect being always due to the same cause, should then be to encourage insight, experiment, and reason in man's dealings with himself. Scientific spirit and method will be rewarded in education as in the physical sciences.

§ 19. *The Physiological Basis of Human Nature*

Intellect and character depend on bodily organs.

The original nature of a man's intellect and character, their growth with age and their modifications by training, all happen in connection with conditions and changes in the man's bodily organization. The organ for behavior is the neuro-muscular system. This consists essentially of an

arrangement for being sensitive to situations, for making movements, and for producing a given movement in response to one situation rather than another, such as is shown in Figure 1.

It is essentially made up of:—

1. Organs for bringing the situation to bear on the animal,—such as the lens of the eye, or the funnel, drum, malleus, incus and stapes of the ear.

2. Organs for being sensitive to special features of situations,—such as the rods and cones in the retina, which are very easily aroused to action or disturbed by vibrations of the ether; or the endings of certain neurones in the membrane of the nose, which are very easily disturbed by the presence of certain chemicals in contact with them.

3. Organs for conducting a disturbance or neurone-action so caused to various parts of the body. These are the great majority of the neurones.

4. Organs for using a neurone-action, so caused and conducted to some muscle, to make that muscle contract. These are the end-plates of the neurones in the muscles.

5. The muscles, glands and other bodily structures whose action can be influenced by neurone-action conducted to them.

The arrangement shown schematically in Figure 1 includes in reality some eleven thousand millions of neurones or nerve-cells or nerve

elements, each of which acts by conducting a stimulus acting on one of its ends to the other end. Each end is often a very complex affair, capable of receiving stimuli from many other neurones and discharging a stimulus to many others. They are all conductors, and most of them can conduct from and to various places.

Especially on the neurones.

The diagram of Figure 1 would then have to be made enormously complex to duplicate man's system for being stimulated by situations, and for connecting these stimuli with each other and with appropriate responses. Also many of the places where the discharging end of one neurone or element in the connecting system is next to the receiving end of another neurone (which are called the *synapses*) cannot properly be represented in any one drawing. *For they change.* They are modified in the course of education so that it becomes easier or harder for neurone number one to discharge into the receiving end of neurone number two. *The physiological basis of education is the modifiability of the synapses between neurones.*

Each man has in the nervous system and its accessories a multitude of chains linking the events in the outside world to the acts which he performs—mechanisms for controlling his own behavior to fit outside circumstances. We can think of this mechanism as a threefold system of receptors, effectors and connectors—for being

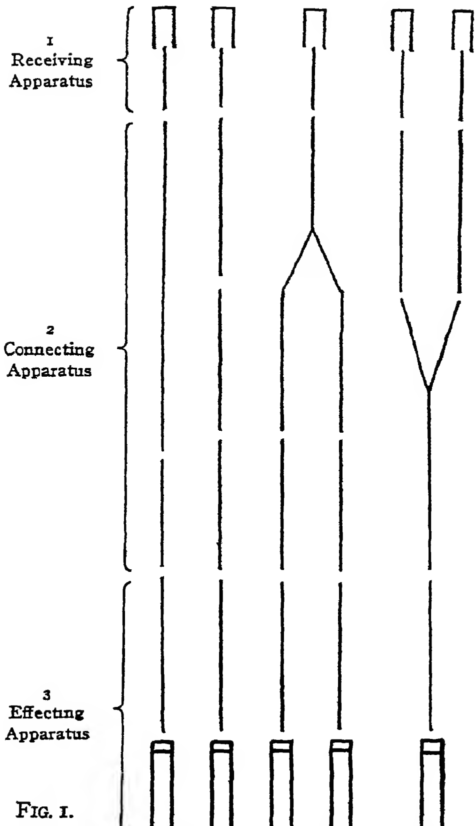

FIG. 1.

1. Apparatus for being sensitive to situations; the sense-organs and first sensory neurones
2. Apparatus for producing one rather than another response to a situation; the associative neurones.
3. Apparatus for making movements; the last motor neurones, end-plates and muscle-fibers

sensitive to situations, making responses and connecting this or that response with this or that situation.

Know and heed man's bodily mechanism.

Education makes changes in a child's intellect and character by making changes in this mechanism, and has to pay heed to its condition in order to avoid injury and waste. We have the simple rule, "Know and heed the mechanism by which the pupil responds to situations."

This is clear enough to anybody in the case of gross, impressive facts—such as blindness, or such defect in the receptors as makes a child insensitive to light; paralysis, or such defect in some connector or effector as makes a muscle incapable of contraction; and idiocy, or such defect in the connectors as makes them excessively sluggish in forming the new connections which correspond to learning. But it has not been followed as it should be throughout. Children have in fact been treated as stupid who were simply more than half blind, as inattentive when they were really deaf, as lazy and perverse when they needed food and rest. Fine sewing and writing have been exacted from children seven or eight years old whose connectors and effectors could achieve it only at the cost of painful and exhausting strain. The old idea that a human being is a magical essence which can know and do irrespective of the body's condition, if it only chooses, still lingers in many school practices.

Even when the mechanism is known, it is often too little cared for. For example, the hardest work the eyes are called upon to do in the ordinary primary curriculum is copying numbers from book or blackboard. This is needless and wasteful, since such examples can be given out in well-printed sheets ready to be done, with a great gain in efficiency as well as protection of the eyes. Again, the eyes' hardest task in the study of a foreign language is hunting for words in the vocabulary and dictionary. This, too, is in the main a waste, since, with properly graded lessons in speaking, reading, learning words and phrases and translating, a pupil would not have so to hunt out more than one fifth of the words he now does and would learn the language in far less time as well.

§ 20. *Individual Differences and their Causes*

The varieties of human nature.

Behavior is due in part to original individual differences in nature. Men are, it is true, more like one another in intellect, character and skill than they are like dogs or horses. But the likenesses which let men be grouped together as one species are consistent with differences which make no one individual the exact duplicate of another save by chance, and which separate some men from some others by enormous gaps. Education thus has, in connection with any given change to be made in children, not one problem but many. The best

method for one cannot be the best for all. There is not one mind reproduced in millions of copies, for all of which one rule will suffice; there are many differing minds, each of which needs, for its adequate education, to be considered to some extent by itself.

Due to sex.

These original differences are due, first, to sex. A child is, for example, by being a girl rather than a boy, likely to be more observant of small visual details, less often color-blind, less interested in things and their mechanisms, more interested in people and their feelings, less given to pursuing, capturing and maltreating living things, and more given to nursing, comforting and relieving them. It is no accident that girls learn to spell more easily, do better relatively in literature than in physics, and have driven men from the profession of nursing.

To remote ancestry.

They are due, in the second place, to remote ancestry or "race." The material furnished to education in the shape of Negrito children is not the same as that furnished by the Filipinos. A course of study fit for Jewish children would be far beyond the capacity of the so-called Pygmies. Far too little is known of original racial differences in intellectual and moral capacities, and the errors of educational practice have here commonly been to exaggerate differences that do exist and to imagine many that do not. But there are real differences of which education must take account.

They are due, in the third place, to near ancestry—to heredity in the popular sense. If one knew nothing whatever about two pupils in a city's schools save that A was a twin of a boy who was in the top fifteenth of children of his age in intellect, while B was the twin of a boy who was in the bottom fifteenth, he could still be practically certain that A would be brighter than B, that A would in nineteen cases out of twenty be in the upper half of the class and that B would have the same probability of being in the lower half. One can apparently prophesy about as much concerning a pupil's rank in college from the rank his elder brother had in college as from his own rank in entrance examinations. Children "take after" their parents in energy, ability to learn, and other original mental traits to approximately the same extent as they do in form, features, or other original physical traits.

To near ancestry.

To "chance" variations.

The germs which produce the next generation are not, however, identical even when from the same parent, so that individual differences in original nature exist within the same-sexed offspring of the same human pair. Such differences are due to the causes, mostly unknown, which make the germ-cells from the same parent vary, and which determine the effect of any given combination of male and female germ-cells.

Education has to reckon not only with these

original differences due to sex, race, near ancestry and the variations in germs from the same parent, but also with the differences due to different degrees of maturity or growth, and those which previous education itself has caused. The treatment appropriate to one stage of mental growth—to one "age" of inner development—differs from that appropriate to an earlier or a later one. Children will thus learn to write more easily at seven than at four, and to dance more easily at twelve than at thirty-six. The wise future course of education will in every case depend upon what previous education there has been and what it has accomplished.

To maturity and previous education.

As a result of the differences originally present or produced by growth and training, education has to be specialized in means and methods. Many sorts of schools are needed, not only to prepare for different careers, but also to fit different natures. Within the same school and class, variations in the kind, amount, and quality of work demanded and in the help given are also necessary. The competent teacher expects variety in human beings and examines each pupil to learn what he really is and needs. From the variety of individual human wants education selects its aims, and to the variety of individual interests and capacities it fits its means and methods.

CHAPTER V

The Material for Education: The Original Nature of Man

The different original natures of men represent variations around one central tendency or 'type,'—the ordinary or average original nature of man as a species.

Man as a species.

Thus, though men vary notably in inborn ability to reason, their variations are around a central tendency, the average capacity of mankind to reason, which is clearly distinct from the average capacity of earthworms or caterpillars. Though, to the situation 'being alone in the dark,' different responses would be made by different infants, even though all had been treated alike, yet their responses would center about an average distressed behavior, whereas deep-sea fish would respond to being alone in the dark with stolid equanimity. The original equipment of the central or average or typical human being consists, over and above his strictly physical, chemical and physiological nature, in tendencies to respond to certain situations by certain sensations, feelings and acts. These tendencies may be called the original mental make-up of man as a species.

When the situation is simple, the response uni-

form and the connection between the two close and hard to modify, the tendency is usually called a reflex. Thus, since the original make-up of man leads him to respond to bright light entering the eye by contracting the pupil, doing so promptly and surely and rather unalterably, the tendency is called the pupillary reflex. When the situation is more complex, the response more variable and the connection between the two more easily modified, the tendency is called an instinct. Thus the tendency of man to respond to the situation—*unfamiliar large animals approaching him rapidly with open jaws*—by trembling, running and hiding, is called one of the instincts of fear. When the situation is very complex, the response very variable and the bond between them very modifiable, the words 'capacity,' 'predisposition' and the like are often used instead of instinct. Thus the fact that man as a species by original nature has tendencies which, when the proper situations are provided, grow into thought, speech and music, would be expressed by such terms as 'the capacity for reasoning,' 'the predisposition toward articulation, imitation and the other factors in speech,' and 'musical capacity.'

Reflexes, instincts and capacities.

§ 21. *Some Unlearned Tendencies of Man*

Man's equipment of reflexes, instincts and predispositions—that is, his original tendencies to respond to certain situations in certain ways

apart from all education—cannot be fully or surely described. For we do not yet know just what in human life is to be credited to original nature, and what to nurture. Moreover, the purposes of this book justify an allotment of space to this topic sufficient only to present samples of a few of the facts which are known. The following inventory of the natural man—of man bereft of all education—can only roughly picture certain leading features in the material given by nature for education to work upon.

Original attention. To the situations—*colored, glittering, contrasting things* (such as black on white, sour after sweet, and the like), *moving things, blood, loud sounds, pain, human faces, gestures, sounds and movements, and all the situations to which he has further original tendencies to respond* (as by running away, pursuit, repulsion and the like)—man responds originally by such movements or restraints from movement as let the situation produce a strong effect on his sense-organs. Thus he moves his eyes so that the light rays from the moving thing fall on the fovea or spot of clearest vision, or holds his head so that the sound reaches his ear in full force.

The hunting instinct. Any not too large, too disgusting or too frightful object arouses the tendency to lay hold of it. If it at first evades seizure, the response of chasing it is evoked. Being started in the chase, man feels satisfied as he draws nearer and annoyed if he is outdistanced.

Being within pouncing distance is responded to by pouncing upon the object. To the situation, *its seizure,* the responses are to choke and beat it until it is still, to exult and to rend it in pieces or drag it to one's habitation, according to its size and one's hunger.

Under the conditions of civilized life few children ever display this sequence exactly as I have described it. Only disguised forms or shreds and tatters of man's original tendencies are permitted by the environment of to-day. But the behavior of boys in undirected outdoor play, the systematized hunt of tag, football and other games, the forms taken by teasing and bullying, the preference for shooting at a living mark, the general passion of man to kill animals, and many other facts of life, prove that one of the human male's most favorite original occupations is direct, naked-handed hunting of beasts.

Collecting and hoarding. To the situation—*easily portable objects which have excited the responses of attention and possession*—there is often the further response of hoarding. This, as a general tendency, is often killed off by the training life gives, but shows itself in reduced forms, in the collections of birds' eggs, tags, picture-cards and other objects whose service is simply to gratify the unreasoning tendency to collect. James reports that hardly a single person of a hundred questioned had not shown this tendency,

and Burk found amongst over a thousand children six to seventeen years old less than ten per cent. who were not, at the time, making a collection of some sort, and only two per cent. who said that they had never made any collections.

Visual exploration and manipulation. To an object that is not being responded to by disgusted avoidance, fear, anger, loving behavior or other specific acts, man responds, so far as the object permits it, by moving his eyes so as to look it over, and by moving his arms and hands so as to hold it, turn it, roll it, drop it, pick it up, put it in the mouth, squeeze it, poke it, shove it away, pull it back, and so on through the long list of activities that make up the indefatigable experimentation of infancy.

Manipulation includes the original basis of the tendencies commonly called, or rather miscalled, constructiveness and destructiveness. Man's original nature is innocent of creating and destroying, of changing an object for or against the welfare of the world. Rolling, turning, throwing down and picking up, putting together and pulling apart, digging holes, tearing books and building with blocks are all due to the same tendency. No one would think it wise to speak of separate tendencies to construct and to destroy the air in the sense of making, on the one hand, words and, on the other, mere mutterings and cooings. So one word, manipulation, best describes the manual

responses out of which constructive and destructive activities both develop.

Vocalization and facial expression. To the situation, *being alive and comfortable,* the original response of gurgling, cooing, prattling, shouting and the like is made, especially if some return sounds are heard. In place of the limited repertoire of cries, growls and the like which a dog or cat displays, the human animal makes sounds including all those used later in language, and many more. Meantime, he may smile, frown, grin, and contort his face in a multitude of twists and turns.

Visual exploration, manipulation, vocalization and facial movements seem at first sight to be useless in comparison with such tendencies as:—to reach for, grasp and put in the mouth, to run and hide from a large strange animal, to throw out the arms when falling, or to cry when left alone in a strange place in the dark. We call them 'play' as if they had not the serious value of the responses directly concerned in getting food or protection. But no instincts have surer utility than the apparently random voice, eye and finger plays. For the end of voice play is language; the ends of eye and finger play are knowledge and skill. In the long run the apparently random voice play is of far greater service to man than the special calls of hunger, pain, fright and relief; and the puttering with eyes and fingers is of greater service than making specially adapted

movements in flight, pursuit, attack, capture and eating.

Curiosity. What is commonly called curiosity is the result of both original tendencies and acquired habits. Its original elements are:—Attention to novel objects and human behavior, visual exploration and cautious approach, reaching, grasping and the food-testing responses, manipulation, and the enjoyment of sights, sounds, tastes, smells and other sensory facts for their own sake.

This last element needs comment. Whereas a dog or cat cherishes sights, sounds and smells mainly for their service in connection with food, safety and the like, man enjoys the mere flow of mental life itself. Merely to hear, see and touch is, other things being equal, a source of satisfaction to him. His mind abhors a vacuum. Novel experiences are to him their own sufficient reward.

General mental activity. Not only sensing things, but also appreciating the connections of events, is intrinsically satisfying to man. A child likes not only to hear a whistle, but also to find the noise coming whenever he blows it. He likes to see a ball roll across the floor, but even more to have it roll after his act of throwing. 'Tumbling blocks' are a delight; but 'blocks tumbling after a push' are an added delight. To blow, to throw and to push are satisfying as cases of instinctive manipulation; to hear a whistle, see

a ball roll and see and hear blocks tumbling are satisfying as cases of the love of sensations for their own sake; the added satisfyingness of *'blow—then a whistle comes,' 'throw—then it rolls,' 'push them down—bang they go'* involves another instinct. We may call it the instinct of 'Pleasure at being a cause,' or of 'Mental Control.' More exactly, it is the satisfyingness of the exercise of connections in the brain whereby doing something makes something happen.

Now this tendency for the exercise of the connecting or learning or habit-forming powers of man to be satisfying to him is of wide-spread influence. As soon as man gets the ability to have ideas and plans, he enjoys getting one idea from another, making a plan and having a result from it, and countless other cases of *thinking something—getting some result therefrom.* When a man has acquired powers of intellect or skill it is often as instinctive or 'natural' for him to enjoy their unforced exercise as to enjoy food, sleep, or conquest. Other things being equal, mental activity is satisfying in and of itself.

General physical activity. A similar satisfaction attends any unforced exercise of the body. The healthy child not only runs, jumps, climbs, pushes, pulls and the like, but also twists, wriggles, bends and contorts himself in movements that are devoid of any reference to food-getting, safety or other direct utilities. He puts his body into action for activity's own sake.

§ 22. *The Social Instincts*

The tendencies so far described have been those out of which education has to build its edifice of habits of work and thought with *material objects*. The tendencies now to be described concern primarily man's responses to the situations offered by *the behavior of other men*.

Chief in importance for education among such social instincts are gregariousness, mastering and submissive behavior, responses to approval and scorn, rivalry, motherly behavior, kindliness, teasing and bullying, and pugnacity.

Gregariousness. Man responds to the mere presence of human beings, other things being equal, by a positive satisfaction. To their absence he responds by discomfort and restlessness. McDougall has pointed out how influential this inborn interest is in our recreations.

"In civilized communities we see evidence of the operation of this instinct on every hand. For all but a few exceptional, and generally highly cultivated persons the one essential of recreation is the being one of a crowd. The normal daily recreation of the populations of our towns is to go out in the evening and to walk up and down the streets in which the throng is densest—the Strand, Oxford Street, or the Old Kent Road; and the smallest occasion—a foreign prince driving to a railway station or a Lord Mayor's Show—will line the streets for hours with many thou-

sands whose interest in the prince or the show alone would hardly lead them to take a dozen steps out of their way. On their few short holidays the working classes rush together from town and country alike to those resorts in which they are assured of the presence of a large mass of their fellows."*

The tendency shows itself equally in our religious observances, in the preference for factory labor compared with domestic service, and in the acceptance by children of many discomforts for the sake of being together with other children in schools and in play.

Mastery and submission. There is, by original nature, a complex interplay of activities between one human being and another with whom he has to do, whereby, as a resulting stable equilibrium, one has the attitude of mastery and the other of submission. This complex of activities and the resulting status of the two parties could be adequately described only at great length, since the size and sex of each party and the attendant circumstances all count in determining what happens. But some main features of the tendencies can be outlined.

When one boy is noticed by another, but without approving or submissive behavior, the former tends to respond by holding his head up and a little forward, staring at number two, continuing whatever he is doing somewhat more energetic-

* *Social Psychology*, p. 86.

ally, and making displays of strength. If number two continues his unapproving and unsubmissive notice, number one may approach him, looking him in the eyes, thrusting the head forward and perhaps nudging or shoving him. To submissive behavior on the part of number two at any stage, number one responds by satisfaction, swagger, strutting, and, perhaps, by kindly behavior. Submissive behavior consists in lowering the head and shoulders, averting the eyes, absence of all preparations for attack, a weakening of muscle-tonus, and hesitancy in movement. To counter-mastering behavior on the part of number two (as by glaring back, not giving way when pushed and the like) either number one becomes submissive himself or a conflict of looks, gestures, yells or actual fighting ensues until one or the other submits.

To a human being much larger than himself, of angry or of mastering aspect, and to effectual physical restraint or punishment in spite of his struggles, a boy tends to respond by submissive behavior. Submissiveness to the kind of person to whom it is a natural response, may be entirely tolerable, though it lacks the richer joys of mastery.

Such crude determinants of superiority and inferiority, of who shall command and who obey, are of course greatly modified by early training, yet they remain, beneath more rational and humane habits, to perplex the gentle, handicap the

modest and peaceful, and make the maintenance of order in the school-room an art wherein the wisdom of the serpent and the harmlessness of the dove must often simulate the tiger's fearless readiness to attack.

Approving and scornful behavior. Smiles, admiring glances and shouts are original responses to relief from hunger, the abatement of fear, gorgeous display, acts of strength or daring, victory, female attractiveness and other impressive behavior from which the onlooker does not suffer. Frowns, sounds expressive of disgust, sneers and hooting are among the original punishments of him who is empty-handed, deformed, craven or pusillanimous in his behavior, and of her who has no charm. Every child and man by original nature thus unconsciously weighs the merits of the natures and acts of those about him. In such crude appreciations our judgments of human worth have their source.

To the situation, *intimate approval*, as by smiles, pats, admission to companionship and the like, from one to whom he has the inner response of submissiveness, and to the situation, *humble approval*, as by admiring glances, from all others, man responds originally by great satisfaction. The withdrawal of approving intercourse by masters, and looks of scorn and derision from anybody in turn originally provoke a discomfort that may strengthen to utter wretchedness.

The reader will understand that the approval

and disapproval which are thus satisfying and annoying to the natural man are far from identical in either case with the behavior which proceeds from cultivated moral approbation and condemnation. The sickly frown of a Sunday-school teacher at her scholar's mischief may be prepotently an attention to him rather than to others, may contain a semi-envious recognition of him as a force to be reckoned with, and may even reveal a lurking admiration of his deviltry. It then may be instinctively accepted as approval.

Emulation or rivalry. When we have separated out from the tendencies to be stimulated by the behavior of other men all the effects of training, we find left as their original roots two facts. First, a man engaged in attending to, reaching for, pursuing, fleeing from, attacking, or any other instinctive activity toward an object or person, acts more vigorously when other men are similarly engaged than when he is alone in responding to the object in that way. Second, a man who fails in such an activity—who does not grasp the food, catch the prey or conquer the foe—feels more annoyed when another is similarly engaged than if he were alone; if he succeeds his satisfaction is likewise increased.

Such special tendencies to greater energy and keener zest in instinctive activities wherein one has the competition or cooperation of other men, develop quickly with training into a more or less general tendency to be spurred on by competition

or cooperation in any activity, and by competition or cooperation thought of as well as directly felt. Often, as James says, "We know that if we do not do the task someone else will do it and get the credit, so we do it." But the tendency is not at all general originally and never becomes entirely so. To get children to emulate the studiousness, helpfulness or modesty of a playmate is far harder than to get them to emulate his speed in running after a stray cat or his struggles to beat a rival football team. Emulation is easier to arouse along the line of originally competitive activities.

Motherly behavior and kindliness. Modern philanthropy and acceptance of the brotherhood of man as a living creed rests at bottom on the original tendency, strongest by far in women, to hold, cuddle, enjoy the welfare of, and relieve the distress of, young and helpless human beings; and upon a more diffused original kindliness toward all human kind. Amidst the somewhat brutal interplay of approval and scorn, mastery, submission and rivalry, fear and hate, from which justice comes only by the rational suppression of first impulses, the maternal instinct stands out as a diviner element—a natural harmony whereby the good of one is the natural satisfaction of another—in which a man's own satisfactions first enlist as combatants for another's wants.

All women possess from early childhood to

death some interest in human babies, being prompted by their instinctive behavior to sympathetic joy and relief. With the changes that precede, accompany and follow child-birth these tendencies gain extraordinary power in attachment to a special object, and manifest themselves as the maternal instinct in the strict sense. But they act to some extent in childhood before this added stimulus comes, and during adult years in spite of its absence. Boys and men are not by nature so entirely lacking in mothering behavior as traditional opinions declare. To give a little child food, to smile sympathetically at its play and to drive off its enemies are perhaps as instinctive in the boy or man as the tendencies to clasp and fondle it are in the woman.

The more diffuse kindliness, sympathy or pity consists, in the first place, of attentiveness to a human being manifestly hungry, frightened or in pain, and active measures to relieve him. In the second place is a positive satisfaction at, and approval of, happy or contented behavior in other men. Even mean and cruel children may, when not in the hunting or angry attitude, be kindly in this second weaker sense. Superior children show it often. Healthy children are in fact endowed by nature with good-will to men, so far as is consistent with the attainment of their own selfish ends; and primitive races of men are usually similarly indulgent.

As an original tendency in man, outright su-

pererogatory cruelty, beyond what he needs for self-preservation, is commonly the result of thoughtlessness (as in anger) or of the direction of hunting behavior toward a human being. The latter case, combined with mastering behavior in the more brutal forms, gives the typical bullying which is perhaps the most detestable feature of boyhood.

Teasing and bullying.

Much of the misery of the world has been due to the misdirection of the mastering and hunting instincts. Both are strong, and both are likely to operate crudely and to extremes. It is a bitter fact that apparently not two men in ten can be given unlimited powers as rulers, generals or school-masters without grave risk that they will abuse it by hounding those whom they happen to dislike or those whom public opinion puts in a class below man, to be hunted or driven.

Imitation.

Some of man's original responses to the behavior of other men are duplications in him of what he witnesses in them. Thus man smiles in a friendly way at a friendly smile, looks at what others are regarding, listens when those around him listen, follows a group who run in the same direction, makes off from the focus from which others are scattering, talks or prattles when others talk, ceases when they become silent, crouches when others crouch, chases, pounces on and rends what others are hunting, and grabs whatever object others reach for. This set of tendencies to respond as others

are responding is the original part of imitation. In addition the acts of other men and the products of their acts are throughout life the sources of many of our ideas of what should be done and of how to do it, but this potency is better considered under learning, since it is only in the course of experience that we come to use men thus as models and guides.

Angry behavior. To the situation, *being thwarted in the outcome of any original tendency* (as by having that for which one reaches withdrawn, by being held when moved to get to a certain spot, or by being robbed of an object cherished in possession), man responds by hitting, biting, kicking and otherwise attacking the thwarting person or object, or even anything which is near at hand. In the course of training, the tendency may connect with any situation which has this element of obstruction to one's activity, so that a collar that will not button may be glowered at or hurled across the room, and a book whose paradigms are not readily learned may be torn and trampled on.

§ 23. *Original Interests and Play*

Two important original tendencies remain to be listed which concern responses to both human beings and other objects in nature. The first is the tendency to feel satisfaction at and cherish certain conditions and to feel discomfort at and

avoid others. The second is the vague group of tendencies called instinctive play.

Original satisfiers and annoyers. Mention has already often been made of the satisfyingness of certain conditions. They have all been cases of the general rule that *the exercise of any original tendency and the production by it of a state of affairs which permits the next step in the original series of responses to be exercised in its natural way*, are satisfying. Thus, to rest after work, to eat when hungry and to chase the prey, are satisfying because certain tendencies in readiness to act are thereby allowed to act. To draw nearer the prey as one runs and to have one's hand touch the attractive object one reaches for are thus satisfying because they are states of affairs which permit the next steps, of pouncing or grasping, to take place in their natural way. The rule is general. Even to run or crouch in fear is, so far as the running and crouching itself goes, satisfying, so that a man will often attack the one who stops his flight. To shriek and writhe in response to pain is originally more satisfying than to bear the pain in motionless silence. The original satisfiers, wants or interests of man equal the undisturbed exercise of his original tendencies, whatever these be.

The original annoyers or discomforts are:— first, sensory pains from cuts, bruises, blows, burns, decayed teeth, indigestible food and the like; second, hunger, thirst and other depriva-

tions from what the body needs to keep it alive; and, third, the thwarting of an original tendency which is ready to act. Only the third of these needs comment. Just as a tendency in readiness to act gives satisfaction if it does act, so it gives discomfort if it does not act. A man chasing the prey and being outdistanced by it is annoyed because the next steps of pouncing and capture, which are in readiness in him, cannot be lived out. The child from whose reach an object is suddenly withdrawn is discomforted because the grasping response, all ready to act, is denied its adequate stimulus. Restraint of the free natural activities of the body and mind is as notable a source of misery as bodily injury or deprivation from food and safety.

Play. Not all the original tendencies of man are of immediate service in securing food or safety for the individual, or perpetuation for the species. Curious examination, manipulation, vocalization and experimentation with objects are, as was noted in describing them, play, in the ordinary sense of the word. Running, jumping and throwing may occur when no *bona fide* prey is pursued. Fighting may be without any real issue of mastery. The responses made in anger may be made for fun. Children who are so fed, housed and protected as to be impelled by no lack of the necessities of life to go for, or flee from, anything or anybody, still maintain vigorous activity in plays which contain in

metamorphosed form the responses of hunting, hoarding, mastery and submission, flight and concealment, and other original behavior-series.

So far of original playful behavior. To it are added, from the earliest years, activities suggested by the things and persons composing a child's environment, so that playing cars, cook, sweep, automobile, and policeman soon seems as natural as waving sticks, grubbing holes, running and hiding. This learned play is influenced by the original tendencies, those suggestions from things and men being most readily adopted which are in the spirit of the inborn proclivities to manipulation, pursuit, fighting, caring for babies, and the like.

§ 24. *The Use of Unlearned Tendencies by Education*

They are its raw material. Such is the original stuff of human nature, out of which the circumstances of life and training have fashioned each of us. As the potter must know his clay, the musician his instrument or the general the raw recruits out of whom he hopes to make a disciplined force, so education has to reckon with these unlearned tendencies. To change men's wants for the better, we must heed what conditions originally satisfy and annoy them, since the only way to create an interest is by grafting it on to one of the original satisfiers. To enable men

to satisfy their wants more fully, the crude curiosity, manipulation, experimentation and irrational interplay of fear, anger, rivalry, mastery, submission, cruelty and kindliness must be modified into useful, verified thought and equitable acts.

The task of education is to make the best use of this original fund of tendencies, eradicating its vicious elements, wasting the least possible of value that nature gives, and supplying at the most useful time the additions that are needed to improve and satisfy human wants. This task is complicated by the fact that original tendencies are often 'delayed'—that is, appear only when a certain stage of mental growth is reached—so that education has to wait perhaps longer than it wishes before it can count upon them. It is further complicated by their transitoriness. Many tendencies appear for a time, but wane if not given exercise and reward; so that education has to strike while the iron is hot. If the response is sought too early, effort is wasted; if it is sought too late, the effort may fail altogether. It is further complicated by the discords between the behavior to which original nature prompts and the behavior which the welfare of man in his present civilized state requires. Man's original equipment dates far back and adapts him, directly, only for such a life as might be led by a family group of wild men among the brute forces of land, water, storm and sun, fruits and berries,

animals and other family groups of wild men. But man has created a new world, in which his original nature is often at a loss and against which it often rebels.

To be preserved, destroyed or redirected.

Some original tendencies should be cherished almost as they are. Some must be rooted out of children—by withholding the situations that would call them forth so that they die a natural death from lack of exercise; or by making their exercise result in pain and discomfort; or by substituting desirable habits in place of them. The great majority of original tendencies, however, should neither be preserved in their exact original form, nor be altogether annihilated, but should be so modified and redirected as to further the improvement and satisfaction of men's wants under the conditions of humane and rational living.

Thus the indiscriminate manipulation of objects is modified into instructive play with sand-piles, blocks or ball; and later into the intelligent use of tools, pencil, pen, typewriter, engine, printing-press and the like. Thus the satisfyingness which originally accompanies notice and approval by anybody is redirected to form special attachments to the approval of parents, teachers, one's own higher nature, and heroes, living and dead, who are chosen as ideal judges. Thus the original incitement of 'another trying to get the food or victory or admiration which we crave' is replaced gradually by rivalry with others in all

work and play, then by rivalry with our own past records or with ideal standards. Thus out of 'collecting and hoarding at random whatever is handy and attractive to the crude interests in color, glitter and novelty,' habits of intelligent scientific collecting and arranging may be formed, and the interest in collecting may be made a stimulus to getting knowledge about the objects collected. Thus the original interests, the tendencies to be satisfied by and annoyed by, to like and dislike, are turned into acquired interests in efficient workmanship, kindly fellowship, the welfare of one's family, friends, community and nation, and finally into the love of truth, justice and the happiness of mankind as a whole.

To neglect them causes failure or waste.

It has been a common error in education to try to make such changes all at once—to demand rationality and morality offhand—to stick ideal considerations and motives into children in a few large doses—to expect them to work, study, be just and be wise because we tell them to. Nothing but harm comes from expecting such miracles. Little more is gained by telling a man to think, or to be accurate, or to have good taste, or to honor truth and justice, than by telling a tree to bear fruit, or a duck to keep out of the water. The eventual nature which is desired for man has to be built up from his original nature.

The strengthening, weakening and redirecting of original nature begin soon after birth, so that

by the time a child enters school he is already in many respects a product of our complex environment of clothes, furniture, toys, tools, language, customs and ideas. School education starts from acquired as well as original tendencies. But the original roots of intellect, character and behavior are still potent. Education which works with rather than against them—which conserves their energy while modifying them into more desirable forms — will have a tremendous advantage. Merely to let children act out what they are to read and make what they are to understand—that is, to enlist their original tendencies to bodily activity and manipulation in the service of knowledge-getting—enormously facilitates school work. Recognition of the original strength, in boys, of the interest in things and their mechanisms, and of the original strength, in girls, of the interest in the thoughts and feelings of persons, will similarly increase the effectiveness of high-school management. The first necessity in education everywhere is to know what man will be and do apart from education.

CHAPTER VI

The Material for Education: The Learning Process

§ 25. *The Laws of Habit Formation*

All the changes that are produced in human intellect, character and skill happen in accord with, and as the result of, certain fundamental laws of change. The first is the Law of Exercise, that, other things being equal, *the oftener or more emphatically a given response is connected with a certain situation, the more likely it is to be made to that situation in the future.* Thus, by repeatedly inducing a child to respond to the question, 'How many are four and two?', by saying, 'Six,' a bond is formed between that situation and that response. This law may be more briefly stated as:—'Other things being equal, *exercise strengthens the bond between situation and response.*'

The law of exercise.

This law needs no comment. It is the most commonly recognized law of human behavior. The need is rather of emphasis upon the other things which may be unequal. Chief among them are the *consequences of the response,* whose

power in learning is recognized by the Law of Effect.

The law of effect. The Law of Effect is that, other things being equal,* *the greater the satisfyingness of the state of affairs which accompanies or follows a given response to a certain situation, the more likely that response is to be made to that situation in the future.* Conversely, the greater the discomfort or annoyingness of the state of affairs which comes with or after a response to a situation, the more likely that response is *not* to be made to that situation in the future. Suppose, for example, that when a child responds to the situation, *being asked, 'How many are four and two?'*, by saying 'Six,' he is always given kind looks, candy and the approval of his fellows. Suppose, on the contrary, that he always received rebukes, blows and jeers. This law may be stated more briefly as:—*Satisfying results strengthen, and discomfort weakens, the bond between situation and response.*

Old connections between situation and response are weakened, and new connections are created, only by some force. Human nature does not do something for nothing. The satisfyingness and annoyingness of the states of affairs

* The other things that are involved are, besides the law of exercise already described, the closeness with which the satisfaction or discomfort is connected with the connection it is to influence, and the readiness of the response to be connected with the situation Each of these factors is of great importance, but their explanation belongs in a special volume on educational psychology.

which follow the making of the connection are the chief forces which remodel man's nature. Education makes changes chiefly by rewarding them. The prime law in all human control is to get the man to make the desired response and to be satisfied thereby.

The Law of Effect is the fundamental law of learning and teaching. By it a crab learns to respond to the situation, *two paths,* by taking the one, choice of which has in the past brought food. By it a dog will learn to respond to the situation, *a white box and a black box,* by neglecting the latter if opening it in the past has been promptly followed by an electric shock. By it animals are taught their tricks; by it babies learn to smile at the sight of the bottle or the kind attendant, and to manipulate spoon and fork; by it the player at billiards or golf improves his game; by it the man of science preserves those ideas that satisfy him by their promise, and discards futile fancies. It is the great weapon of all who wish—in industry, trade, government, religion or education—to change men's responses, either by reinforcing old and adding new ones, or by getting rid of those that are undesirable.

§ 26. *Selective Activities*

Human nature is selective throughout. Of any total state of affairs or situation, some one part may be, and commonly is, predominant in arous-

ing response. Thus, of the turmoil of outside events, certain particular vibrations of the air and of the ether are effective in stirring man's receptors to feel and act, while the higher sound-waves and the infra-red and ultra-violet ethereal vibrations are not. Out of a baby's total surroundings, the familiar face of its mother or the moving brightness of a toy, provokes attention to the neglect of the rest. The interested reader's thoughts are determined by the meanings of the words of the book—the size of the type, the length of the lines, the noises in the room, and other features of the total gross situation being comparatively without influence. Suppose the total situation to be *a school class in geometry engaged in the consideration of the problem, 'If two parallel lines are cut by a transversal, the alternate interior angles are equal.'* Not only may the figure and the problem be the only part of the total situation that is active in determining a boy's thoughts, but the one tiny element of the parallelness of the two lines may have special predominance. Suppose that the situation —*thinking of a bicycle*—aroused the thought 'Greek.' Evidently, one small feature of the situation determined the response.

All behavior is selective.

The law of partial activity of a situation.

We have then, as a general law of human learning, the fact that *one part or element or feature of a situation may be prepotent.* The response made will then be that which is connected, by original nature or

by the laws of exercise and effect, with that part or element or feature. This may be called the Law of Partial Activity. It may be stated more briefly as:—*Connections may be with elements of a situation as well as with the situation as a whole.*

The law of analysis. The second law of selective thinking, which we may call the Law of Analysis, states the conditions under which even a very subtle element comes to have responses bound to it. It is that:—*When any response has been connected with many different situations, alike in the presence of one element and different in other respects, the response is thereby bound to that element; so that when that element appears, even in a very different total situation, it will tend to evoke that response.** Thus, having been led to respond by saying and thinking, 'Four,' to the situations:—*Four apples, how many?, Four dots, how many?, Four boys, how many?, Four fingers, how many?, Four inches, how many?, Four feet, how many?, Four ounces, how many?, Four handfuls, how many?,* etc., etc., the child tends to respond to *Four peas, how many?, Four girls, how many?,* or *Four chairs, how many?,* by saying or thinking 'Four.' The element of 'fourness' tends to evoke a response of its own wherever it occurs.

By virtue of this law of analysis we are able to

* This is not a complete statement of the facts in the case, but is adequate for the purpose of this introduction.

acquire habits of response to elements which are never experienced by themselves alone, which are always melted into amalgams with other elements. Man can thus respond to yellow, blue and green, regardless of what the colored object is; to long, short, big and little, regardless of what the measured object is; to heat, mass, square root, gas, liquid, solid, animal, vegetable, mineral, good, bad, greater, equal, before, caused by, and all qualities, conditions and relations, regardless of any particular things that may be before his eyes.

Such habits of response to threeness, fourness, fiveness, dogness, catness, molecules and atoms, vertebrateness and invertebrateness, multiplication and division, but, and, if, equality, cause and effect, and the innumerable other abstract elements with which human thought and conduct are concerned, give man his power over nature and himself. They are the most important habits to be formed by education,—the essence of human learning.

The effect of these two laws on thought. The process of forming connections in thought, feeling and conduct is thus enormously intricate. Man's learning is not made up merely of connecting a million or so total responses—such as putting on his hat, thinking of sixteen, or saying *elephant*—each with some one of a million total situations, such as 'walking out of his own front door with

his hat in his hand on a sunny day,' 'being asked what the square of four is,' or 'seeing *elephant* on a printed page and being asked to pronounce the first word in line three.' Human learning involves, on the contrary, a complex arrangement of tendencies within tendencies and a hierarchy of habits. The printed letters, e l e p h a n t, for example, may connect as a whole with the sound of the word made aloud or in inner speech; each group of them, such as ele or pha or nt, tends also to evoke whatever sounds it has gone with in the person's experience; the ph has not only bonds leading to the sound that has been made in response to it, but also bonds, that must now be held in check, between the p and its customary sound-value and between the h and each of its sound-values. Each letter has indeed also some slight tendency to still finer bonds. The element of shape in the t, for example, has an appreciable tendency to arouse the response of thinking of a telegraph pole; each may arouse its letter name instead of its various customary sound-values, and so on.

As a further result of the laws of Analysis and Partial Activity, any one total situation may be responded to in many ways, its various aspects and elements producing, one after another, their special responses. This process of trying this, that and the other promising response of thought or action is the first step in reasoning. The

second step is the selection of the most promising among them to serve as the situation to provoke further ideas on the subject.

§ 27. *Knowledge, Intellectual Powers, Interests, Conduct and Skill*

Education deals with complexes of tendencies.

What we call intellect, character and skill is, in the case of any man, the sum of the man's tendencies to respond to situations and elements of situations. In the average civilized man, the number of different situation-response connections that make up this sum would run well up into the millions. The average elementary-school child at graduation almost certainly has formed over a million such bonds in working order. A complete inventory of him would require at least twenty books the size of this! In place of any list of these detailed tendencies to do just this, or think just that, in each particular situation, educational theory summarizes the man in terms of certain broader traits, such as knowledge of arithmetic, helpfulness at home, honesty, love of music, and the like.

Each of these broader habits, abilities, interests or propensities commonly involves the existence of many original, and of still more acquired, connections between concrete particular situations and concrete particular responses. Even so simple and narrow an ability as the ability to add

up to 9+9 is by no means limited to the presence of the forty-five connections,—

Situation,	1+1—	response,	2;
"	1+2—	"	3; and so on, up to
"	9+9—	"	18.

There are also the thirty-six new connections with the 'reverses,' 2+9 being not the same situation as 9+2. Each of the eighty-one combinations may appear as a spoken question, in all sorts of tones, high, low, gentle, harsh, and as a seen question in many different forms,* to say nothing of differences in the size, color and spacing of the writing or printing.

A common grouping.

These broader traits may be grouped roughly under knowledge or information, intellectual powers, conduct, interests and skill. It is unfortunate for the student of education that our language has not used the plurals—*knowledges, conducts* and *skills.* These plurals are needed to describe the human traits which educational science studies, such as:—knowledge of the meanings of the numbers, one to ten, knowledge of German grammar, knowledge of botany, conduct in respect to lessons, conduct in respect to the property of others, conduct in respect to the suffering of others, skill in draw-

* Such as: 9 and 2, 9 plus 2, 9 + 2, $\begin{array}{r} 2 \\ 9 \\ \hline \end{array}$, $\begin{array}{r} 6 \\ 4 \\ 2 \\ 9 \\ \hline \end{array}$

ing, skill in handwriting, skill in sewing, and the like.

The intellectual powers are hard to distinguish from the corresponding knowledges. Thus one may equally well say, 'a reading knowledge of German' and 'the power to read German.' The distinction most usefully made is that *knowledge* is used when the trait or ability is a group of particular connections, such as between the sounds of words and their spelling; while *power* is used when the trait is some element or elements of several such groups of connections. Thus one would speak of the power to compute and to draw accurately. But all such distinctions are of minor importance.

Practical problems. The three chief questions which education asks about these large, complex groups of tendencies, which we may for clearness call knowledges, powers, conducts, skills and interests, concern their composition, improvement and relations one to another. With respect to any such trait we may inquire:—(1) What is its nature? Of what more detailed tendencies is it made up? (2) To what extent, in what ways, and under what conditions, can it be made more efficient? (3) What other traits does it go with or depend upon; and what help or harm to other traits comes from improving it?

The first set of problems, concerning the exact analysis of, say, the ability to read, or the appreciation of music, or skill at drawing, or the linguistic interest, cannot well be treated without re-

liance upon an acquaintance with technical psychological facts which few readers of this book will possess. The second and third sets are the subjects of the next two sections.

§ 28. *Improvement by Practice*

Students of human nature have only within a few years begun to study scientifically the concrete facts of the improvement of mental abilities by practice. The first investigation of the effect of practice upon any of the complex abilities, such as education deals with, was reported by Bryan and Harter in 1897,* the abilities being reading and tapping out the telegraphic language. Some of their findings will make a useful introduction to the facts and problems of practice in general.

The amount of improvement. Figure 2 shows the amount of improvement from forty weeks of study in a school for telegraphers. The number of letters that can be tapped out per minute rises from practically zero to 140; and the number that can be read from the instrument's ticks rises to almost 120. This amount of improvement can be made, however, only by an intelligent worker who practices with zeal. Many students never get far above the minimum requirement for a position—seventy-two letters per minute.

Figure 3 shows the amount of improvement

* In the *Psychological Review,* Vol. IV, No. 1, and Vol. VI, No. 4.

from forty hours of practice at typewriting by the 'sight' method, the beginning being made after some general instructions. It is interesting to note that forty hours of practice enables one

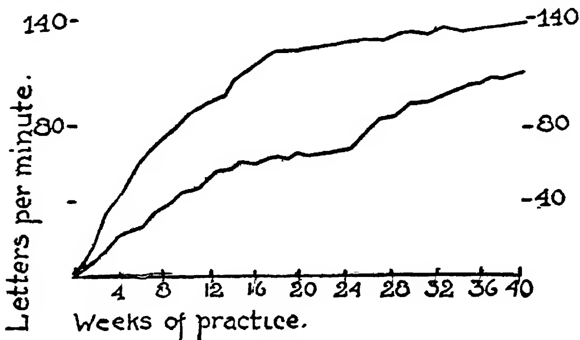

FIG 2

FIG. 2. The curves of practice for a certain individual in sending (upper curve) and in receiving (lower curve) telegraphic messages Each sixteenth of an inch (approx.) along the base line equals one week of practice. The number of letters that can be tapped out in the telegraphic language in one minute at the expiration of any given number of weeks of practice (up to 40) is represented by the height of the upper curve at the corresponding point. The lower curve shows similarly the number of letters that can be read in a minute from the taps of the telegraphic key after any given amount of practice (up to 40 weeks). After Bryan and Harter, *loc. cit.*

to typewrite nearly as fast as he can write legibly by hand. In general, when one sets oneself zealously to improve any ability, the amount gained is astonishing. For example, ten minutes a day of forcing practice for ten days increases

the amount of addition which one can do per minute by a fifth, without diminishing its accuracy.

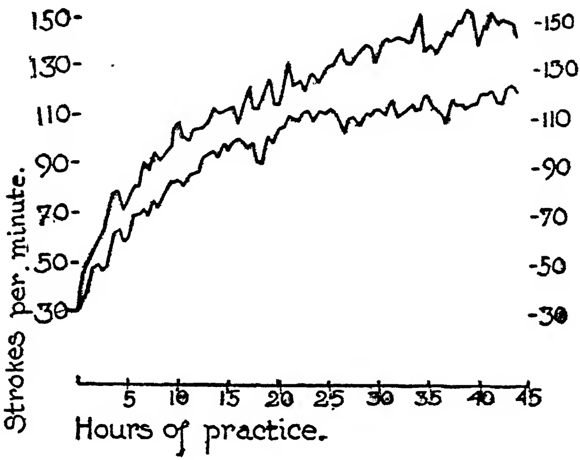

FIG. 3.

FIG. 3. The curves of practice for two individuals in typewriting by the sight method after some preliminary instructions. Each twentieth of an inch (approx.) along the base line represents one hour of practice. The number of strokes that can be made (with few or no errors) in one minute after any given amount of practice is represented by the height of the curve at the corresponding point. After Book, *Psychology of Skill*, plate opposite p. 20.

The limits of improvement. So great improvement is, however, possible only within the lower ranges of an ability. After a time, indeed, one may reach his limit and be unable to improve at all.

The most expert telegraphers, who have thus reached their limit in the ability in question, can read off the ticks at the rate of over 150 letters per minute. This means the ordering and interpreting of over 600 sounds per minute. The experts at typewriting can copy any ordinary matter at the rate of 70 or 80 words per minute. Such experts in typewriting, golf, adding, needlework and the like, are probably specially gifted by nature with a high limit, and their achievements are probably above what men in general could do with no matter how long practice. On the other hand, we stay far below our own possibilities in almost everything that we do. We stay where we do, not because proper practice would not improve us further, but because we do not take the training or because we take it with too little zeal. We remain as incompetent as we are, because we do not care enough about improvements.

Changes in the rate of improvement.

It is clear from Figure 2 that the rate of improvement—the amount gained per week of practice—is not the same throughout, in the case of either sending or receiving. The sender does not, each four weeks, add 14 to his score; but gains about 43 in the first four weeks, 37 in the second four, and hardly over 2 in the last or next to the last four weeks. The rate of improvement grows less as practice increases. In receiving, the rate of improvement is about the same during each of the first fourteen weeks; then drops to almost zero

for about ten weeks; and then rises again, rapidly at first, but in the last twelve weeks more slowly. The changes in the rate of improvement, shown clearly in the practice curves of Figure 2, are thus very different in the two cases, *sending* and *receiving*.

The *plateaus*, or periods of apparently zero rate of improvement, are of special interest. They may represent desirable resting-periods, periods of mental organization of what has been acquired; but in other cases they may represent mere stagnation for lack of zeal or a change in method. We are all likely to stay on such a level, far below what we would be able to achieve by proper effort.

The elements in improvement. The improved efficiency of a mental trait or ability involves:—the addition of new processes; the elimination of old ones that are undesirable; and the simultaneous building up of a new one and abandonment of an old one, which we call 'substitution.' These facts are easily observable in almost any practice experiment. In typewriting one at first uses only the

Adding new processes. forefingers, but comes to add movements of all the other fingers. In addition one gets the new power to think 'thirteen' immediately upon seeing 4, 7, 2 in a column; or even to think thirty-nine, sixty-seven, ninety-six, hundred seventeen, hundred forty-two, upon seeing 17, 22, 28, 29, 21, 25 in a column. The elimination of harmful or irrelevant facts is equally

important. One learns not to fidget, not to worry about the result, not to listen to noises in the street, in almost any task. In handwriting, improvement with practice consists in part in omitting the tremblings, overpressures, and erratic pushes and pulls. In adding, one ceases to say to oneself, 'Three and nine are twelve; twelve and seven are nineteen,' and the like; or even to think anything save, 'Twelve, nineteen,' and so on. The substitution of a better process is seen in the case of 'reading' the telegraphic ticks. At first each tick is identified and they are put together to make letters. Then the series which equals a letter is taken in as a whole and given its letter value at once, the old deliberate identification of the letter piecemeal becoming unnecessary. Then the entire series which stands for a common word, like *the, in, of, has,* or *was,* gets power as a unit to call up that word directly, and the old putting of the letters together is left to one side. Finally, a long series of clicks, standing for a phrase, comes to evoke the response of that total phrase without any need on the part of the telegrapher to get the words and put them together. Practice thus builds up, level by level, a hierarchy of habits, each new set making some of the older ones unnecessary.

Elimination.

Substitution.

Besides such easily observable additions, eliminations, and substitutions, there are alterations within what seem from the outside to be single,

indivisible processes, but which are, physiologically, compounds. Thus the process of responding to *the sight of two and seven in a column to be added,* by the thought 'nine,' implies the action of many processes in the neurones of the brain. By addition, elimination, and substitution among the parts of this hidden compound, a man, after practice, comes to think of 'nine' 999,999 times out of a million, whereas before he would go wrong twice as often; or comes to think of 'nine' in a fifth of a second, whereas before it required two fifths. We can, then, improve without knowing how we improve. The satisfyingness of the greater accuracy or quicker speed may select for retention or elimination among the hidden processes of the brain, as well as among features of behavior which can be isolated and described by ordinary observation.

Subtler changes.

The conditions of improvement.

Mere practice does not make perfect. The repetition of an activity need not improve it. Indeed, if just the same thing happened each time, the pupil could not improve. Repetition is useful because the pupil *does not exactly repeat,*—because a chance is given him to vary what he does, to select for use the variations which improve the ability, and to eliminate those which weaken it. He may, as has just been shown, seem from the outside to do the same thing; but, if he is to improve, the neurones in his brain do not, trial by trial, repeat exactly their previous performance.

To improve he must vary; and the variations must include some that are beneficial. They may include many that are irrelevant or even harmful, for these can be eliminated by proper means. So any condition that stimulates the pupil to a variety of methods has a chance of leading to improvement. If he is working with a definite aim, so that these variations arise as means adopted consciously or unconsciously in the service of that aim, this chance is increased.

The good variations must be selected for survival by the law of effect. Hence the supreme importance of interest in the task and in improved ability at it. Interest multiplies the satisfyingness of every success and inspires effort to discover and eliminate the causes of every failure. Ten minutes of practice with full zeal, the worker being keen to do his very best and joyous at every advance in his accomplishment, is worth an hour of work done to avoid a worse fate or of play engaged in to pass away the time.

§ 29. *The Influence of Improvement in One Mental Ability upon the Efficiency of Other Abilities*

Bettering one useful ability helps others.

The improvement of one ability may help or may harm others. Thus improvement in speed and accuracy in marking the verbs in page after page of English books, due to special practice, brought about a

reduction in the time required to find prepositions, or adverbs, or nouns, but an *increase* in the errors and omissions.

In general, the improvement of any one of the abilities which are recognized as desirable helps any other. There are certain elements—such as neglecting the impulse to idle and to heed sensory distractions, expecting to work with a will, desiring to find a wise method, not being worried or over-excited, and the like—which may play a part in making a man's responses to almost any situation more effective. By establishing or confirming these attitudes and ideals of method and procedure in the course of improving one ability, say, to compute, one may be in a better position in the case of many others. Also there are many elements which reappear in very many different situations, so that encountering them in one prepares somewhat for many others.

But less than is commonly supposed.

The gain in the efficiency of other abilities from the improvement of one is, however, far less than has been expected. Thus, suppose that the reader should now test himself in respect to the speed and accuracy with which he could find and mark words containing both *i* and *t*, or words containing both *s* and *p*, or capital *A*'s, and the like. Suppose that he should then practice at finding and marking the words containing both *e* and *s* until he made substantial improvement. On re-testing his ability to find the *i—t* words, or *s—p* words, he

would find that it had improved only about a third as much as the *e—s* ability. Even so slight a difference in the abilities restricts the improvement made in one in large measure to it alone. Or suppose that the reader, before and after practice in remembering a sequence of four intensities of sound for eight seconds in spite of distraction, tested himself in memorizing poetry, rows of figures, or a series of shades of gray. He would manifest only about a fifth as much improvement in these abilities as he made in the ability specially trained.

Extravagant notions of the transfer of improvement.

It used to be thought, erroneously, that man's intellectual and moral responses were due in the main to a few formal abilities, such as attention, memory, imagination, reasoning, conscience, the will and the like, which worked in large measure irrespective of what particular stuff was to be attended to, remembered, reasoned about or chosen. It was thought that improvement, say, in reasoning about Latin grammar, meant in the main an improvement in the ability to reason in general, and only slightly an improvement in special skill in thinking about Latin syntax alone. Intellect was not thought of as a multitude of special bonds between particular situations and particular responses, but as a few faculties or powers which could conduct certain operations equally well with almost any situation whatever.

The following quotations, each from a dif-

ferent author, represent fairly this now discredited notion of very great general mental discipline by the improvement of one or another ability:—

"The pursuit of mathematics gives command of the attention. . . . The man or woman who has been drilled by means of mathematics is the better able to select from a number of possible lines which may be suggested that which is easiest or most direct to attain a desired end. The second purpose of this study is . . . the strengthening and training of the reasoning powers."

"By means of experimental and observational work in science . . . his attention will be excited, the power of observation . . . much strengthened, and the senses exercised and disciplined."

"Correct use of the foreign language . . . makes *concentration* imperative and serves in an eminent degree as a discipline of the *will*. . . . Practice in the use of a foreign language cultivates the imagination."

"The capability of concentrating attention on a certain point in question, in whatever field it is acquired, will show itself efficacious in all fields."

"Will-power and attention are educated by physical training. When developed by any special act, they are developed for all acts."

As a result of the experiments that have been made since 1900, such expectations of universal transfer of ability in large amounts are no longer entertained by competent thinkers. It is agreed that there is no mysterious necessity in the nature of man which makes an improvement in gram-

matical reasoning spread to produce great improvement in all rational thought, or makes improved attentiveness to numbers in computation produce power to attend to the cloth in a loom or the marks on a butterfly. It is agreed that a gain in one ability improves others only in so far as it is proved to do so,—that the question of the disciplinary value of any training is a question of fact to be measured, not an article of educational faith to be assumed. It is agreed that, roughly, we can hope for such wider improvement only in so far as the other abilities in question are in part identical with the ability specially trained. Investigations to ascertain just what these identities are, and just how far the improvement of certain abilities influences others, are among the most important now being made by scientific students of education.

CHAPTER VII

THE MEANS OF EDUCATION

§ 30. *Educative Forces in General*

Means of education defined.

The means of education are all the causes that produce or prevent those changes in human beings with which education is concerned. Such are climate, soil, scenery, animals, plants, shelter, food, parental care, government, churches, schools, libraries, family, friends, customs, productive labor, games, and the like, with all the varieties of each, and all the accessories of each variety. A list of all the means employed as accessories of schools alone would fill a large volume. Perfect education would control all means that could change any human being—the bacilli of typhoid that might weaken him, the 'gang' he went with, the games he played, as well as the lessons that he studied and the books that he read.

In thought it is easy to separate off these changers from the human nature changed, the means of education from its material. But *in fact* the line between changer and changed—means and material—is often hard to place.

Means and material—what happens to a man

and what he originally is—are often inseparably linked in the real world, so that it is only for convenience in thought and practice that any line is drawn. It is in fact less important to try to mark one off from the other definitely than to note the fact of their linkage and the resulting fact that any means becomes effective through a reaction by the person to be educated. Any change in him is conditioned by his own nature and implies that he responds somehow to the stimulus given. The educative force must, one might say, not only get *at* him but get *into* him. Educative forces are effective only as they provoke responses.

Persons and things as means of education. One might well emphasize the importance of human beings compared with other animals, plants, and inanimate objects as changers of human nature by giving them a separate name, such as *agents,* and describing the varieties of human influence upon human beings separately. Man's influence may be exerted unintentionally, as when the mannerisms of parents teach children, or intentionally, as when parents pronounce words for a baby to imitate. The influence of things, plants, and of animals in almost all cases, is exerted without foresight or purpose on their part. The educative action of means other than human is also commonly impelled and guided by some human being. Gravity, galvanism, climate, scenery, grass, worms and the like do their educational work,

chiefly as tools in the hands of agents or human means.

Teachers—that is, human beings whose special work in the world is formally recognized as education—are, of course, only a small fraction of the human means of education. Parents and friends are perhaps surer means; public speakers and writers are perhaps weightier; and the vague sum of behavior which is called public opinion, custom, or the *mores*, is more wide-spread. The teacher is, however, rapidly becoming a larger and larger share of the total human educative force.

The need of ingenuity and experiment with new means.

It is instructive to bear in mind the gain that is often made by the addition of a new means of education or the alteration of an old one. Recent examples in the case of elementary school education are:—supplementary text-books, libraries, museums, pictures, sand-piles, blocks, tools, projection-lanterns, medical inspection, visiting nurses, milk-tickets, clinics, excursions, outdoor class-rooms, workshops, gymnasiums, savings-banks, and the like. The instructiveness consists in the inference that further modifications of means may equally economize and improve education. It seems indubitable, for instance, that giving, say, three fourths of the addition examples in the form of properly printed sheets, the answer only to be written by the pupils, would save a hundred million hours a

year of the time of children in this country alone, with no loss in any other respect and with other advantages.

So also the substitution of typewriting machines for the pen in the case of pupils in the last two grades who expect to do office work seems imperative. The average time required for an interested pupil in these grades to learn to write by machine as fast as he can write legibly by hand is probably little over fifty hours. Even if it were a hundred hours, one typewriter in use through the school session (making generous allowance for the time when it might have to be unused) would each year give that degree of mastery to eight pupils. Making, as before, generous allowance for natural wear and tear and damages, a pupil could be given that degree of mastery at a cost for tools well under two dollars.

There is need not only of experimentation with new agents and instruments in school education, but also of critical examination of those already employed. What persons shall be chosen as teachers, what subjects shall be chosen for study, and what arrangements shall be made for the time, place, equipment and management of schools, are questions which, when taken in connection with the countless differences among the individuals to be educated, offer a practically infinite series of problems.

A survey of the whole field, no matter how superficial, is impossible; and would in any case

be less instructive than the same time given to a few sample problems. I therefore present, in this and the following chapter, some of the facts about only the following problems of educational means:—(1) The various studies and sorts of knowledge, (2) the means of choosing or 'electing' studies, (3) the arrangement of studies, (4) the efficiency of men and women as teachers, and (5) the efficiency of personal and 'text-book' teaching.

§ 31. *The Values of Studies*

Among the many means used in school education the 'studies'—that is, the portions of the arts and sciences which are learned—are the most notable. The problem of deciding what each of these is good for as an educational instrument, and which of them, if any, are superior to the rest—the problem, that is, of the values, absolute and relative, of studies—has naturally led to much discussion.

Doubtless we all feel sure that German has a greater value than Ojibway as a school study, though we might find the fact hard to prove; but whether German has a greater or less value than Greek few would assume to decide. The scientifically proved facts concerning just what changes are produced in pupils as a result of this or that study are so very scanty that one is left to estimate values on the basis of general knowledge of human nature and of the studies them-

selves. Such estimates are insecure, but can be made less so by knowledge and use of certain principles.

Value equals value as studied. The first of these is that the value of any study, as a means or instrument of education, depends on how the teacher teaches it and what the pupil learns from it, not upon what the study is in and of itself. English literature has little value as a means to refining taste, broadening sympathy and deepening insight, if the teacher makes it a system of petty gossip about Carlyle's dyspepsia and Shelley's eccentricities. Geometry does little for the reasoning powers of a pupil who learns it by rote.

Two of the greatest sources of misleading in arguments about the value of studies are the false assumptions that by merely putting a subject in the course of study we can put its value into the lives of the children, and that the value which a subject may have when pursued with zeal by an expert will be realized when it is studied by no matter whom. For example, it might seem that, since psychology is the science of human nature and behavior, and since to learn to control oneself and live well with other human beings is man's greatest work, psychology should be a leading subject in schools for all. But, as it was taught in high schools, psychology did not have any such superior value. So, also, expert lovers of a study are likely to feel sure that, since it does so much for them, it should be studied by

all. They learn their error if they observe its actual results.

A study's value is complex. The second principle is that the value of a study is a complex—the resultant of several different sorts of value. Adopting the customary division into physical education, intellectual education, moral education, technical education and esthetic education, we have to test each study's effect on health, knowledge and intellectual abilities and interests, conduct, skill, and appreciation or taste. Or, considering the ultimate purposes of education, we have to measure each study's service in making man's wants better and in making him able to satisfy them. Thus it is expected that literature as a school study will increase the student's good will toward men by broadening his sympathies and inspiring him with emulation of ideal characters, will replace selfish sensory pleasures by the impersonal satisfaction of reading, and will also give him an added insight into human nature which will help him to manage himself and other men, so that his and their wants can be better satisfied. One reason for the difficulty of decisions about the relative values of studies as means is the fact that they are means to such different purposes or ends. It is hard to balance ten per cent. improvement in health against four per cent. improvement in morality or eight per cent. improvement in intellect.

Thinkers about education tend in this respect

to fall into two opposing camps—one eager to devote the energy of schools to making wants better, and the other eager to use the schools to help men get what they do want. The former favor whatever studies they think likely to improve ideals of thought and conduct, with little heed to satisfying even these ideal wants, much less those which man actually feels. The latter urge for children those subjects by studying which they may get health, escape poverty, enjoy their leisure hours, and otherwise have more of what a decent, but not very idealistic, person wants. Of course thinkers of the first group are glad to gratify wants incidentally; and those of the second group are glad to improve, incidentally, the wants which they are satisfying. But there remains a conflict between those who value primarily a study that teaches men what to want, and those who value primarily a study that helps them get what they do want.

Each study's value is complex in two further ways. It may have intrinsic value as content, and derived value as a tool. It may have a narrow or 'specific' value, by the improvement it makes in the ability specially trained by it; and a broader, or 'transfer,' or 'disciplinary,' value, by the improvement it makes in other abilities.

Stenography, telegraphy, handwriting, logarithms, and the Greek or German script-alphabet, contrasted with the facts of physics, chemistry, or Greek literature, exemplify tool-values

versus content-values. In general there is cause for suspicion of a study whose sole or chief value is as a tool. There is likely to be waste in teaching such a subject, since the pupil may not realize the need which the tool is designed to meet. Also there is likely to be waste because the pupil's education may cease before he learns what to do with the tool, or because he lacks the ability or the zeal to use it. Thus those parts of algebra which are of value primarily as tools for use in advanced mathematics are to be questioned as required studies for all pupils in the first year of high school, since not one pupil in ten will study advanced mathematics, and since only very gifted pupils can use these delicate tools for quantitative thought without special training. Some of the tools of thought, such as reading, writing and simple computation, are, on the other hand, so easily and so widely usable that the value of these studies is very great. But, even with them, it is well to make sure that the tool will be used by having it acquired in connection with content of intrinsic value,—that is, by having children learn to read with matter worth reading, learn to write as a means of telling facts, making wants known and the like, and learn to add or multiply as a means to quick and sure solution of real problems.

Intrinsic value and value as a tool or instrument.

The difference between the narrow value, due to the particular ability primarily trained, and the

disciplinary value, due to the transfer of improvement to other abilities also, cannot be well illustrated by contrasted studies. For every study may have both sorts of value in some measure. But it is clear that unless the geometry of the high school has a high degree of disciplinary value by its training in rigid reasoning from general principles, it should give way to other studies in the case of many pupils. Its narrow value, as special skill and knowledge in reasoning about circles, triangles and the like, is obviously less than that of physics, biology or economics, which train pupils to reason about matter and motion, animal and plant behavior, and the motives and acts of men.

Specific and disciplinary values.

Summary.

In attempting to estimate the value of a study, then, one should, if possible, secure the actual facts which measure the changes produced in students as a result of having taken that study. Where this is impossible, one can at least take account of how the subject is taught and of how it is studied, of its effect on health, knowledge, intellectual abilities and interests, conduct, skill and taste, of what improvement it makes in wants and which wants it satisfies, of its service as content and as a tool, and of its disciplinary value as well as the particular abilities that it primarily trains.

In the case of the knowledge value of the school subjects certain further principles are useful. These are stated in the next section.

§ 32. *What Knowledge is of Most Worth*

We judge the relative value of different sorts of knowledge by the extent to which each helps toward the ultimate end of education—the improvement and satisfaction of wants. Thus it is easy to see that knowledge of German is worth more than knowledge of Choctaw, that knowledge of the cause of malaria is worth more than knowledge of the cause of tickling, or that knowledge of the properties of oxygen is worth more than knowledge of the anatomy of a trilobite.

The complexity of the problem. Even in such obvious cases, however, the condition, '*worth more to most people*,' ought to be added. For it may be more to the common good for a few people—government agents for Indian affairs, for instance—to know an Indian language than to know German. For a scientist, who by knowledge of the cause of tickling may be led to important discoveries, to know that rather than the cause of malaria may be best. Also the value of each fragment of knowledge depends upon what other knowledge goes with it. Knowledge of the properties of oxygen is of much less value alone than when in combination with other facts of chemistry. The difference between wisdom and pedantry is in part a difference in the arrangement of knowledge.

In the third place, the value of any knowledge

is due to many factors, such as its interestingness, its utility, its moral influence, and its disciplinary effect upon the entire intellect and character of its possessor. Consequently the knowledge that is of more worth in one respect will often be of less worth in others, and many judgments concerning the values of knowledge have to be prefaced by, 'other things being equal.'

With these three limitations—that better means better in most cases, better provided it has other relevant knowledge combined with it, and better in so far as concerns the particular quality under discussion—the following rules are serviceable:—

Realities *versus* fictions. Knowledge of the real is better than knowledge of the non-existent. This may seem self-evident, but the implied command has not been obeyed. Babies are told all sorts of nonsense; kindergartens abound in pleasant lies; a fourth of the reading-matter for children in the elementary schools is fiction. These choices of the false instead of the true have not been justified by proof that the fancy does little harm by being false, and much good by being interesting and stimulating to right feeling and action. The balance of value has not been proved to favor the fancy rather than the truth proposed as a substitute. In many cases the choice of the false *could* be justified. Red Riding Hood, Cinderella and the Three Bears, for instance, do much good by the innocent pleasure they give and

by their admirable service in teaching children how to read. In many cases, too, the ostensibly fanciful account may mislead little children less than the ostensible truth. But in other cases they learn lies to no advantage.

Extent of application. Knowledge is of value in proportion to the number of situations to which it applies. 'Knowledge of principles is better than knowledge of mere facts,' and 'knowledge of fundamentals is better than knowledge of derivatives,' are common partial statements of this rule. It states what should oftenest be the deciding factor in the choice of the knowledge to be given to all, or nearly all, pupils alike. It governs the choice between German and Choctaw, or between oxygen and trilobites. Knowledge of means of measuring time, distance, area, volume, weight and wealth, and of performing simple computations, is by it judged to be of more value than the knowledge of geometry that could be obtained by the same pupils in the same time. Percentage is by it judged to be of more value than interest, brokerage or discount.

Importance of application. Knowledge is of value in proportion to the importance to human welfare of the situations to which it applies. The preference of knowledge of the cause of malaria to knowledge of the cause of tickling is an application of this principle. So also knowledge of steam-engines would be preferred to knowledge of millinery, in spite of the fact that hats figure

more frequently in life. Knowledge pertaining to moral conduct is thus above knowledge pertaining to manners; knowledge pertaining to health is above knowledge pertaining to wealth; knowledge pertaining to the family and the state is above knowledge pertaining to such conventions of language as spelling and punctuation.

Power in prediction. Knowledge of the future is of more worth than knowledge of the past. When the two are equal in respect to the intellectual pleasure, the discipline and the moral inspiration given, knowledge that can predict is better than knowledge that merely records, because it helps us better in the main business for which knowledge exists—to control the forces of nature and ourselves.

This principle has not had the recognition or influence in education which it deserves. Verification by the future is one of the best tests by which to distinguish science from false opinion. Moreover, knowledge of the past is often of value chiefly as evidence for some other knowledge, and so may be nearly as valuable to the world at large when possessed by only a few experts as when repeated in a great many students' minds. Finally when knowledge is tested to see what it will predict, it is less likely to busy itself with trifles.

The use of these principles in actual decisions may be illustrated in the case of the value (for elementary-school pupils in general) of the study

now commonly made of Greatest Common Divisor and Least Common Multiple, in comparison with an equal amount of study of what I shall call the 'Remainder Division Table,'—that is, of the series:—

These criteria illustrated.

10 =	_2s			
10 =	_3s	and	_	remainder
10 =	_4s	"	_	"
10 =	_5s			
79 =	_8s	"	_	"
79 =	_9s	"	_	"
80 =	_9s	"	_	" , etc.

In respect to the improvement of wants—the cultivation of the good will and of impersonal pleasures—there is little reason for choice. The value in either case lies in the mental training and direct utility in satisfying wants. In respect to mental training, also, there is little or no difference, the opportunity to impress habits of accurate and intelligent use of division and subtraction in the case of the remainder drills being nearly or quite as serviceable as the opportunity to impress similar habits of using division, multiplication and comparison in the case of drills on Greatest Common Divisor and Least Common Multiple. The issue is then one of the practical services rendered by the two bodies of knowledge, *as knowledge*. Both are alike so far as reality *versus* fiction and history *versus* prophecy are concerned. We have then to inquire about

the number, and importance to human welfare, of the situations to which Greatest Common Divisor, Least Common Multiple and the Remainder Table apply.

The knowledge of Greatest Common Divisor is a means of reducing fractions, and of solving such problems as:—

A merchant has 60 pounds of tea of one kind, 75 pounds of another, and 100 pounds of another, which he wishes to put up in the largest possible equal packages without mixing the different kinds. How many pounds should be put in each package?

Mr. A. has 324 acres of land in one farm and 78 acres in another. He wishes to divide these into the largest possible fields of equal size. How many fields will there be, and how many acres in each field?

The service of study of Least Common Multiple is as a means of adding and subtracting fractions, and of solving such problems as:—

How long must a box be that no room may be lost in packing in it books 6 inches, 8 inches, or 12 inches long?

A lady desires to purchase a piece of cloth that can be cut, without waste, into parts 4, 5, or 6 yards long. How many yards must the piece contain?

I have a certain number of pennies which I can arrange in either 4, 6, 8, 10, or 12 equal piles. What number of pennies have I, if it is the least number that admits of such arrangement?

How many bushels will the smallest bin contain that can be emptied by taking out either 7 bushels, 10 bushels, or 30 bushels at a time?

Four agents start from New York at the same time. The first makes his trip in eight weeks, the second in nine weeks, the third in fifteen weeks, and the fourth in twenty weeks. How many weeks will pass by before they will again start out from New York together?

But cancellation is a far better method of reducing fractions than Greatest Common Divisor; and the use of any common denominator that the worker can think of quickly is a far better method in adding and subtracting fractions than Least Common Multiple. As to the service for problems, the advantage over common-sense solutions is in any case slight, and the number of such problems that life offers is so few that text-book makers have difficulty in getting problems for the application of Greatest Common Divisor and Least Common Multiple that are not fantastic. Of the seven problems quoted, from a text-book of presumably high grade, six are thus fantastic.

The Remainder Table is of constant service in 'short' division, in getting the trial quotients in long division, and in solving some of the commonest problems of the small shop. Its extension to such cases as

30 = _13s and _ remainder
30 = _14s " _ "

makes one of the best introductions to long division. Study of it may then be expected to

have a much greater value than equal study of the calculation of greatest common divisors and least common multiples.

The retention of elaborate instruction in Greatest Common Divisor and Least Common Multiple and the neglect of the Remainder Theorem seem thus to be fair illustrations of the need of two of our rules:—knowledge is of value in proportion to the number of situations to which it applies; and in proportion to their importance to human welfare.

CHAPTER VIII

THE MEANS OF EDUCATION (*concluded*)

§ 33. *The Election of Studies*

The problem defined.

Since there are more subjects for study than any one person could possibly complete, there must be election or choice among them; since individuals differ as they do in original capacities and interests, and since the welfare of the world requires men to engage in, and be prepared for, different careers, there ought to be such election. After the first few years of school the question is not of a uniform requirement *versus* an elective system, but of *who* shall elect, *from how wide an offering*, and *in what manner*. For our purpose these questions may be considered to most advantage in a sample case, say, the choice of studies for high-school pupils in a city maintaining a high school with five hundred pupils and twenty teachers, offering one hundred courses, each lasting a year and occupying from three to five periods of fifty minutes' length in the schedule. How may choice among them be made the most effective means of education?

The issue oftenest discussed is whether the

pupil shall choose for himself or the school for him. But this is a somewhat unusual issue. The pupil does not, though left to himself by teacher and principal, choose for himself, unless his parents are very careless or indulgent. The school, if left to itself by pupils and parents, does not choose *for the pupil.* It either makes a set choice alike for all pupils with no consideration of *him,* as in a curriculum all required; or it delegates the choice for him to some one adviser. Most commonly of all, it forces the pupil and his parents to make, at the beginning, one large and crucial choice—such as between Classical, Scientific, Commercial and Manual Training curricula; then it makes a set of choices alike for all those who have chosen alike in this first crucial election; finally it leaves the pupils and parents to choose, subject to more or less restriction, how the remaining time shall be spent.

Whatever may be said of the merits of wholesale decisions by the school in comparison with decisions for individuals by themselves and their parents, this common system—of forcing a crucial election of the bulk of four years' work upon the latter at the very start—is certainly improvable. It encourages 'free,' unintelligent, unadvised election in its worst form. This so-called 'required' system is really a system of the most extended election, the election of a whole course in a lump, and at the worst possible time, when the pupil can know almost nothing about the offering and

less than at any later time about his own capacities. How it can be improved will appear by returning to the question as originally put:— Who shall choose, from what offering, in what manner?

Who shall choose? High-school pupils are incapable of choosing very well, though the probable folly of their choices has often been exaggerated and the value of self-direction in the matter should outweigh the harm from a fair percentage of wrong choices. Their parents are in many cases still less sure to choose for them what the common good requires that they study. The principal in our supposed school of five hundred pupils has not the time, and rarely would have the knowledge, to choose for the five hundred better than they and their parents could do. The pupil's teachers of the previous year represent usually a better combination of knowledge of the pupil's interests and capacities and knowledge of the offering of the school than the principal; hence the choice sent up from pupil and parent, accepted or amended by a committee of his teachers of the past year, would probably be a moderately good one. But the plain fact is that lack of knowledge, wisdom or time will make the choices of pupil, parent, principal, teachers, or any combination of them, faulty. If right choice of studies is as important as the advocates of all the different systems of requirements and election agree that it is, then a school of five hundred

pupils should provide somebody whose duty it will be to utilize the information that parents and past teachers have about pupils and the aspirations of the pupils themselves, to study the careers open to high-school pupils of one, two, three or four years' standing, the offering of the school and the results of past choices, to teach pupils to choose wisely, to suggest choices to them, and to pass on their suggestions. The system of advisers in vogue in colleges is an amateurish approach toward such an organization of the election of studies as a means of education through an expert director of choices.

From how wide an offering shall choice be made?

Present practice in a twenty-teacher high school would often be to require that at least one eighth of each pupil's total curriculum be devoted to specified courses in English, and that at least one twelfth of it be devoted to specified courses in mathematics. Having once made the crucial choice of the 'commercial,' or 'classical,' or 'manual training' curriculum, from half to three quarters of it will be prescribed further.

With a director of choices properly trained to make them as rational as may be, much more could be left to choice. A pupil might even have his entire curriculum chosen for him individually, with the result that two pupils in the school might have not a single common element in their curricula. I venture to assert that in a school of

five hundred there will be at least one pupil who ought not to take any of the courses given in English, at least one who ought not to take algebra, at least one who ought to spend seven eighths of his time upon science and technology, at least one who ought to spend seven eighths of his time on history, economics and the like, and at least one who ought to make some apparently fantastic combination such as algebra, geometry, advanced mathematics, music, first-year Greek, second-year Greek. English history, stenography and sewing.

In what manner shall choices be made?

Choices should as a rule be made gradually, a year or half year's work at a time, but seriously, a choice being fully tried before it is given up. The pupil's own preference should be consulted, since interest is one of the best symptoms of capacity, and capacity for a study is one of the best symptoms of fitness to use it for the common good. But the pupil whose preferences are given weight must himself assume some responsibility for the result. To fail in a course suggested by himself may properly count more against his record than to fail in a course imposed by the director of choices. Choice between notoriously easy and notoriously hard courses should be eliminated, all courses in the school that carry the same credit being made of approximately equal difficulty. Choice should include the amount as

well as the nature of the work to be done. Some pupils can complete the total course in three years with less effort per year than others would require to complete it in six years. Choice should be made in part experimentally to discover the pupil's powers, as well as cautiously to prevent their waste. Finally, the work of the director should be positive in suggesting promising possibilities, as well as negative in persuading against follies.

§ 34. *The Arrangement of Studies: Sequences and Correlations*

The studies which will form a pupil's curriculum having been chosen, their effectiveness as means of educating him depends upon their arrangement. It is, for instance, obvious that if the anatomy and surgery of the brain are both to be studied, the greater gain will come from studying the anatomy first. This problem of arrangement may be split into problems of sequences and problems of contemporaneities, or, as they are usually called, correlations.

The problem of sequence. Thus the usual sequence is,—the bulk of the arithmetic before any of the algebra; the surely economical sequence for children eight to sixteen is,—the four fundamental operations with integers, fractions and decimals before the bulk of the algebra; an interesting problem in sequence is whether the

equation form, with a convenient sign for the unknown quantity, should not be introduced early in the arithmetic.*

The problem of correlation. Thus composition is often correlated, or put together on the program, with the study of literature, the topics about which one writes being topics about which one has just read in the course on literature. Thus the arithmetic and the geography of latitude and longitude could well be taught contemporaneously. The first two years' work in reading, in writing and in spelling should be closely correlated.

Interesting problems in trying to plan better arrangements of studies than are now in force may be found in contemporaneous study of certain topics in arithmetic and manual training, or of the history of explorations and certain topics in geography; and in the sequences of Latin and French, or of United States money, decimal fractions and the metric system. In the last case, practice has changed in one generation to studying United States money before decimals as an introduction and aid to understanding them. I predict that in another generation parts of the metric system will also be taught in the first year

* The sign might be simply an empty space, the equations being such as:—

$7+2=\_$	10 cents $=\_$ nickels
$7+\_=9$	4 3s $=\_$
$9=7+\_$	$\_$ 3s $=12$
$9=\_+2$	$12=\_$ 3s, etc.

or two of the course in arithmetic as a means of making concrete and significant the place-values, units, tens, hundreds, etc., and the function of the decimal point.

Educational theorists have devised numerous schemes for the arrangement of the whole program of studies in the elementary school, or for the work of this or that year in it. As a sample of these we may take the plan of Dr. Van Liew, who, following Rein, advocates the choice of history as the central and chief element in the course of study of the elementary school, its arrangement roughly in the sequence of chronology, and the correlation of all the other studies to it. By his plan the sequence in history would be:—

Grade	1.	Fairy stories and folk tales
"	2.	Robinson Crusoe
"	3.	Indian life and pioneer stories
"	4.	
"	5.	Discoveries and explorations
"	6.	Settlements and colonial history
"	7.	The Revolution and the Constitutional Period
"	8.	

The other work of the school would be in each year correlated—or, in the term used by this author, 'concentrated'—to the topics studied in history, in such ways as are suggested by the following quotations from Dr. Van Liew's account:—

"*Literature and Reading.*—. . . By a careful selection of material, the reading of the child can be made to bear upon his historical studies. . . . In the first two years the child is occupied with the task of learning to read. Yet even here, as soon as a little facility has been attained, concentration can help him.

"*Singing.*—. . . Here, above all, the national songs come into requisition; their meaning should be made the more significant to the child through their relation to the historical material.

"*Drawing.*—. . . The teacher can, with ease, so arrange the drawing lessons of the pupil that they present the development of art in its chief epochs, parallel to the epochs of history.

"*Geography.*—. . . When he hears of the ideas and deeds of Columbus, for example, he is at once interested in attaining a deeper insight into the mathematical relations of the earth. If his mind is at this time mature enough, this is the time to open the subject.

"*Mathematics and the Sciences.*—These branches are more difficult to concentrate than those previously mentioned. Still, concentration is here possible and beneficial. A large share of the work of concentration is accomplished in the instruction, as we shall shortly demonstrate. Otherwise these branches are to be considered as the bearers of knowledge that enter into the service of man. This fact is brought to the pupil's consciousness by drawing upon the various, already concentrated series for the concrete material of mathematical problems, for example. In the same way some fact that has appeared in the historical series with which it is concentrated, gives the impulse for scientific investigations. Both mathematics and science, however, should find a centre for their work in the life and environment of the

child, for here the objective material is found, upon which the entire instruction should be based." *

There have been attempts to find some one general principle for arranging the elements of a curriculum. Samples of the most useful doctrines of this sort are:—Make the arrangement fit the psychology of the student, not the logic of the study. Teach a thing when the need for it is felt. Teach the tools of thought and skill along with, not in advance of, content of intrinsic value.

No one of these doctrines can be followed absolutely, except perhaps the first, with an elastic interpretation. But they are useful warnings against (1) arranging a subject for study in the way that seems most fit to one who has learned it all, (2) arranging a subject independently of pupils' interests and motives, and (3) arranging a subject as if the pupil could appreciate beforehand what the total effect of each stage's work would be, and act with perfect wisdom.

As illustrations of the three doctrines and of the errors against which they give warning, we may take the arrangement of the systematic course in the country's history, of the total course in drawing in the elementary school, and of the instruction in wood-working.

To one who knows the history of a nation, the

* W. Rein, *Outlines of Pedagogics,* translated by C. C. and I. J. Van Liew, 1895, pp. 154–161, *passim.*

order in which the facts most suitably arrange themselves is of course the forward chronological order. All text-books within my knowledge unhesitatingly follow that order. It has, indeed, seemed indubitable to teachers as well as writers of text-books that the students should begin where the country began. But what has seemed so sure is very questionable. The pupil actually begins with knowledge of the present condition of his own immediate environment plus a variable and chaotic acquaintance, through talk and books, with facts located vaguely in other places and earlier times. Perhaps the story of the voyage of the parents of some pupil in the class should precede that of the voyage of Columbus; perhaps the date when some house in the town was built, what was there before it, and what was there in the boyhood of the grandfather of some child in the class, should be studied before the dates of the first colonies. Perhaps to work back from the Philippines to Alaska, to the annexation of Texas, to the Louisiana Purchase, in a study of the territory of our nation to-day, would be more instructive than to begin with the Spanish, English, French and Dutch settlements. The educational value of finding the causes of what is, and then the causes of these causes, is so very much superior to the spurious reasoning which comes from explaining a record already known, or pretending to prophesy what the wisest men of the

Psychological *versus* logical order: History.

past could not prophesy, that the arrangement of the first part of the course in history in the inverse temporal order, leaving the forward chronicle till later, deserves serious consideration.

I have purposely chosen a case where the doctrine suggests something beyond, and contrary to, even the best present school practice, so that the reader may be sure that the doctrine is more than a repeating in words of what common sense already teaches us to do in fact. Cases that are clearer, but that show present practice catching up to theory, are:—(1) introducing a student to a foreign language, not by a systematic study of its grammar, but by simple hearing, speaking and reading; and (2) replacing the description of our globe, and the proofs that it is a globe, by simple geographical studies of the school-room, yard and neighborhood. Here what seemed, to the one already acquainted with the subject, to be its logical beginning has been found a very poor beginning for the student.

Knowledge given in response to felt needs: Drawing.

Drawing may tell facts, as in a map, a floor-plan of a house, or the picture of certain neurones and their connections shown in Figure 4. It may represent objects, giving to the eyes something more or less like the impression they would get from the object itself, as in the drawing of Figure 5. It may produce a purely esthetic effect, as in Figure 6. These three features of drawing may be called informing, du-

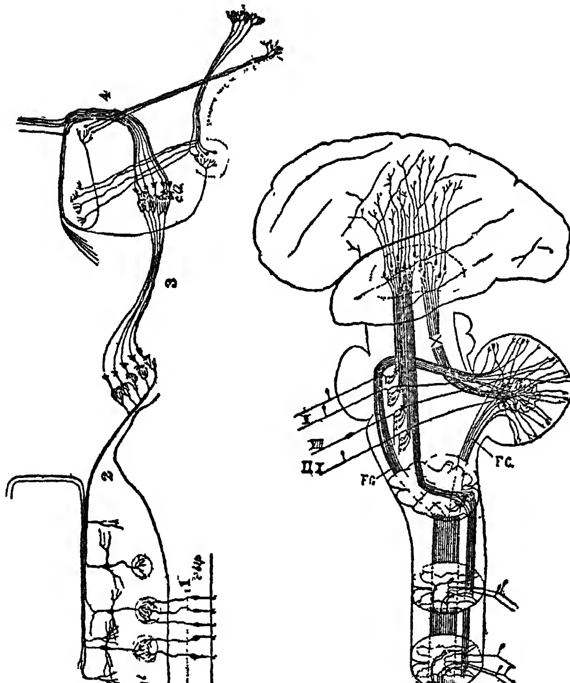

FIG. 4

FIG. 4. Illustrations of *informing* or *illustrative* drawing—of drawing used as a language to tell facts. The drawing at the left shows schematically the arrangement of the neurones which conduct stimuli from the olfactory sense-organs in the nose. The drawing does not present the four sets of neurones as they would appear to the eye, but simply tells the essential facts about their arrangement in the brain. The drawing at the right tells similarly the story of the arrangement of the neurones which conduct stimuli from the sense-organs in the skin up to the cerebrum and cerebellum.

FIG. 5.

FIG. 5. An illustration of representative drawing.

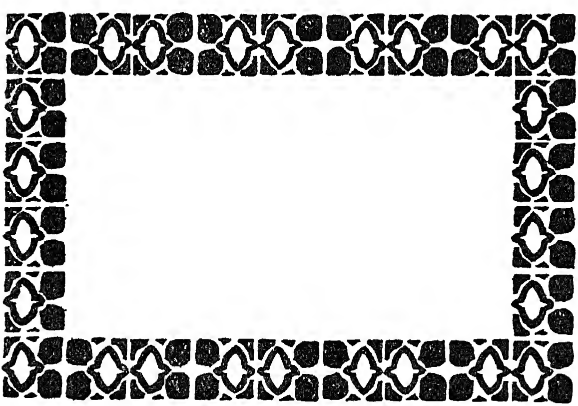

FIG. 6

FIG. 6. An illustration of decorative drawing

plicating and beautifying; or illustration, representation and decoration.

By far the commonest, earliest and most potent of the corresponding interests in drawing is that in informing or telling facts by it. Drawing is to children first of all a language. Figures 7, 8 and 9 display this interest fairly. They tell their stories, but show little or no concern about representing the objects concerned as they would appear to the eye, or producing anything beautiful. This sort of drawing leads naturally, with improvement, to map-making, mechanical drawing and schematic illustrations in science; but it leads to representative drawing only in consequence of the special need of identifying an object very exactly, as in portraits, by giving to the eye the impression the object would give; and it leads to artistic drawing only in consequence of the need of giving the observer a sense of beauty.

The promising arrangement of a course in drawing in the elementary school is then to begin with the 'natural,' fact-telling drawing; to develop it along such lines as drawing maps, plans, illustrations of the facts learned in elementary science, history and the like; and to introduce representative drawing by first showing the need for it,—as when the story of objects, one back of another at various distances, needs perspective drawing to tell it well, or when the story that this is a disk and that a ball needs shading to tell it well. The artistic drawing or creation of beauty

FIG. 7.

FIGS. 7, 8, and 9 illustrate the common lack of interest in young children in the representative or decorative

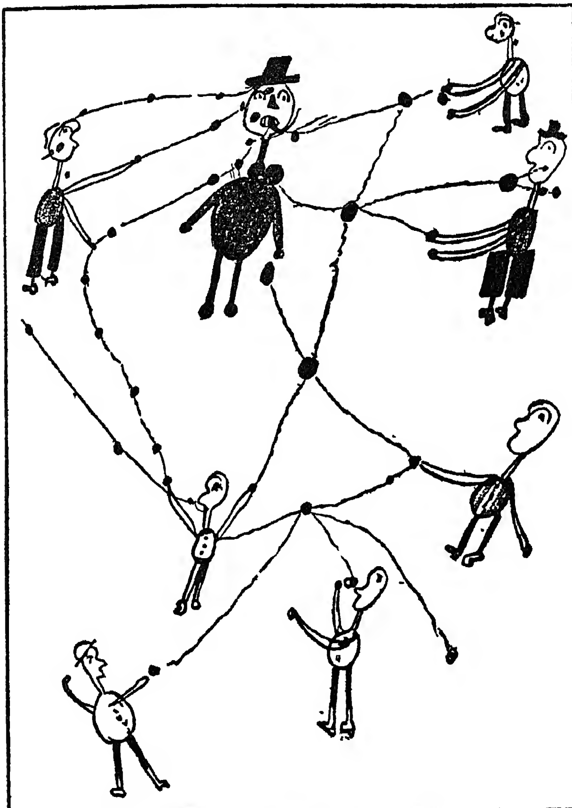

FIG. 8.

uses of drawing—their use of it simply as a language to tell facts. FIGS. 7 and 8 are after Kerschensteiner, *Die Entwickelung der Zeichnerischen Begabung,* page

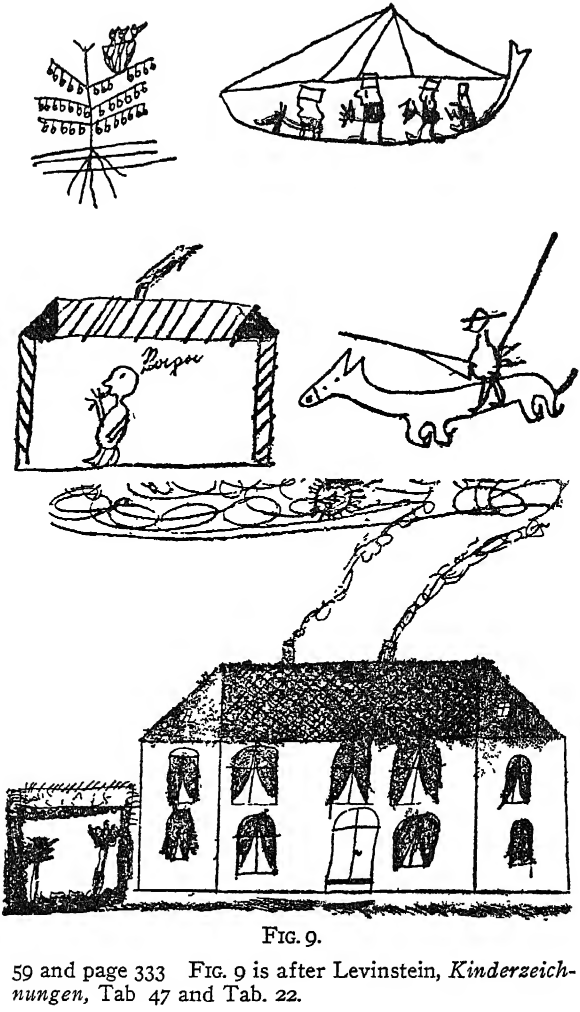

FIG. 9.

59 and page 333 FIG. 9 is after Levinstein, *Kinderzeichnungen,* Tab 47 and Tab. 22.

with the pencil would begin with simple designs to decorate real objects which the pupils wished to have beautiful. Each element of technique would be taught similarly when the effective telling of the story made the need for added technique realizable.

The traditional arrangement in drawing neglected or even went dead against interest and nature, forcing the pupil to copy cubes, cylinders, cups and saucers in representative drawing at the very beginning, compelling exactness of outline when what the children cared to tell with the pencil did not in the least require it, putting illustrative, schematic and mechanical drawing after, instead of before, representative and decorative drawing, and teaching each thing in technique before—often long before—the pupil felt any need for it. As a result, children who might have become fair draughtsmen with a permanent interest in the use of the pencil, drew painfully sad-looking chairs, buttercups and vases while they were in school, and nothing at all thereafter.

Technique through content: Wood-working.

Some of my readers probably had in school a course in wood-working which began with the description of the tools, continued with an account of the way to use each, and ended with actually making something. Books to fit such a plan are still to be found. But experience has taught what correct principles could have taught in advance, that, at least for boys and girls in the ele-

mentary school, the nature and use of a tool are best taught in connection with getting some result of intrinsic value with it. Similarly the expert teachers of physics are now insisting that its instruments of precision shall be introduced by their service in getting information of value in itself at the time, not with a mere promise that by learning to make exact measurements one will sometime get significant facts.

§ 35. *Men and Women as Teachers*

There is occasionally serious debate concerning the American practice of choosing women so exclusively to conduct the school education of children from six to fourteen, and so extensively to do the same work for boys from fifteen to nineteen. This practice is odious to many intelligent men and some women in this country, and is directly contrary to the practice in the other large nation whose devotion to education is most notable—Germany.

The question defined. It would be unwise to review the arguments *pro* and *con,* since they are rich in guesswork and poor in fact, and almost universally ignore the decisive question. This is not, "Which is the best educational means, a hundred men or a hundred women, ten men and ninety women, etc., etc.?", but, "Which is the better educational means, the hundred men that can be hired for x dollars, or the hundred women, or

the ten men and ninety women, that can be hired for the same price?" It will be wise to get in mind certain facts that bear on the answer to this latter question, or series of questions, in the United States taken as a whole.

It is a series of questions, because the answer may not be the same for a salary of five hundred dollars a year and for one of five thousand, or for the education of pupils six to ten and for the education of pupils sixteen to twenty. The question is put concerning the United States only, because the facts deciding its answer might be very different in Germany or China. It is put concerning the United States taken as a whole, because the relevant facts might be very different in Massachusetts and in Mississippi; space is lacking to answer it separately for divisions of the nation. Facts toward the answers rather than the answers themselves are given, because the student of education to-day needs especially to form the habit of studying facts and evidence rather than opinions and conclusions.

Women not chosen by favoritism.

The choice of women over men has not been a matter of sentiment, enthusiasm or theory. Those who in the past turned the elementary schools over to women were, and those who to-day are turning the high schools over to women are, men who did it and do it *against* their own sentiments and theories. With few exceptions, the choice of a woman rather than a man has meant, and still

means, that the woman is so obviously able to do the work in question better, according to the standards of the time, that she is chosen in spite of sex prejudice. Superintendents and school boards are eager to get men to teach, but their sense of educational duty will not let them get the men who apply.

Nor by lowering standards. The choice of women over men has not been a matter of lowered standards of academic or professional training. On the contrary, there is evidence that raising the requirements quickly increases the percentage of women among those securing positions in elementary or secondary schools. The change from men to women in this country seems to have gone with general devotion to education and with universally accepted symptoms of educational advance. The cases of Massachusetts from 1840 to 1880 and of North Carolina during the past decade may be taken as samples.

The great educational advances made by Massachusetts during the second third of the nineteenth century were accompanied by a marked increase in the proportion of women teachers. When Massachusetts was leading the progressive movements toward compulsory education, free high schools, systematic supervision and the training of teachers, she was also in advance of all other States in increasing the proportion of women chosen as teachers. The establishment of normal schools, the requirement of graduation

from them for the better positions, and the later requirement of high-school graduation before entrance to the normal schools—all have been accompanied by an increase in the number of women teachers. So by 1871 only one teacher in eight in Massachusetts was a man, whereas elsewhere in this country three out of eight teachers were men.

During the past ten years one of the most extraordinary records of educational advance has been made by North Carolina. In less than ten years (from the school year '99–'00 to that of '08–'09) this State increased its school property fivefold, nearly trebled the amount paid (per capita) for education, lengthened the school year from 70 to 100 days, and increased the number of children (per thousand children five to eighteen years old) in attendance upon schools by over half. The great public zeal and devotion which were aroused during this period constitute one of the most gratifying features in the educational history of the new South. Now within this same period the proportion of women teachers rose from half to seven-tenths, the increase being far more rapid than during any similar period in the history of that State, and more rapid than in any other State during the same period.

Of course it is not to be inferred that the choice of women rather than men as educational agents is a sure symptom of educational advance,

but it does seem certain that choosing them is far from implying any cheapening or degrading of the office of the schools.

Unverified apprehensions of danger from feminization.

The prophecies of evil effects from the feminization of the teaching staff of elementary and secondary schools that have been made have not been verified by the facts. One of them has indeed been definitely disproved. That is the opinion that the turning of the sex-balance in the teaching staff of high schools toward a larger proportion of women has caused, and will cause, a similar turning of the sex-balance in the student body. Boys, it is said, will inevitably forsake a secondary school taught largely by women. But the increase in the proportion of boys in those high schools which changed (in the ten years from 1896 to 1906) toward a larger proportion of men teachers was only very slightly greater than in those schools where women displaced men. A change from half men and half women as teachers to one third men and two thirds women (for instance, from five men and five women to five men and ten women) is accompanied by a change from half boys and half girls as students to not more than 47½% boys and 52½% girls. What little difference appeared was probably the cause, rather than the effect, of the increase in the maleness of the teaching staff. That is, when for any reason more boys attend a high school, the very fact may be used as an argument tc induce the

school board to appoint a man rather than a woman. Conversely, when for any reason there is a large increase in the enrollment of girls.

A study involving 184,000 students showed that the proportion of boys is less than four per cent. greater in high schools where from forty to ninety-one per cent. of the teachers are men than in high schools where from sixty-five to one hundred per cent. of the teachers are women. Here, too, the slight correspondence found may be due to the disposition of school officers to adapt the sex-balance of the teaching staff to that of the student body.

The only clear probability of harm done by the present use of educational funds to hire women rather than men lies in the prevention of gifted and devoted women from having and rearing children of their own flesh and blood. Effectiveness from the narrow point of view of schoolroom education may be consistent with injury, small or great, to the life of the country as a whole. It is certainly risky to have over half of the graduates of women's colleges remain childless by profession, even if they spend their time working for the children of others. It is likely that the world loses more by the absence from motherhood of women teachers who might otherwise marry than by the absence from the teaching profession of the men who would have their places.

This probability of harm is of course curable in

many other ways than by driving women out of teaching. Teaching is not inconsistent with having and rearing children. A mother of children could spend her time in teaching as well as in superintending servants, cooking meals, mending clothes, or washing dishes.

Superior women *versus* inferior men.

Lest any reader forget the original question upon which these various facts bear, I repeat that the practically decisive question is of the men and women available at a given cost. It would almost certainly be a gain for the teachers of boys and girls to include a larger proportion of men if the best men would do that work with equal zeal. It would probably be a gain if men of the same station among men that our women teachers have among women would do the work with equal zeal. But whether the men obtainable with the funds in hand are equal in capacity or interest to the women is the decisive question. One may regret the fact that something like half of the boys and girls in city schools never have a man as teacher, and yet not regret their not having the particular men who could be got, at the same salaries, to replace the women now teaching the upper grammar grades. One may wish that a larger number of gifted men would be moved, by zeal for teaching young people, to work at a small salary in elementary and high schools, and yet not wish that school officers would appoint men as teachers for no other reason than that they were men.

§ 36. *Personal* versus *Text-book Teaching*

The value of speech, facial expression and gesture.

Personal teaching is commonly largely oral; text-book teaching, save in the rare cases where phonographic records are used, appeals to the eye alone. Oral instruction has the advantage, in the case of little children, of relief from the work of interpreting the little-known visual symbols and of the stronger appeal of words heard over black marks seen. Instruction through books has the advantage that each pupil can think at his own rate, get the fact over and over again as he needs, test himself point by point as he goes along, and make notes of his difficulties for later use in questioning the teacher. Book-teaching gains in relative value as students, by more training, become used to getting ideas from print. If just the same work were to be read aloud monotonously and given in print, there can be little doubt that second-grade children would profit more by having it given by speech and college students by having it in print.

The intonation, facial expression and gesture, and the illustrative actions which are accompaniments of oral teaching, commonly add interest and excite to useful mental activity, the more so the younger the children are and the less gifted at reading. These human accessories, even when unpleasant to see and hear, still win attention

from most men as books do not. It is only the specially facile reader, who also is intellectually beyond the need of another's intonation and bodily expression, that prefers to read rather than hear a story, and to read men's books rather than hear them talk.

Detail and consequent length.

But teachers and text-books rarely do give anything like the same treatment of a topic. The teacher's personally managed treatment is almost always longer, easier, more determined by special exigencies of the occasion, and characterized by a selection and treatment of facts such as no text-book displays.

Length is an impressive diffèrence. The actual facts, principles and applications given in a college course of ninety hours can often be printed in a book that a capable reader could get through in nine hours. The extra eighty hours must have a value equal to eighty hours of such study, experiment, problem-solving and the like as could be guided by printed directions, if it is to be justifiable. One reason why children seem to learn so much better from personal teaching than from books is that many of them spend much time in class-meetings and little time upon books.

Comprehensibility.

The same teacher would almost never make up a text-book with so easy questions, so much repetition, so many illustrations, and so full explanations as he gives personally to a class. He would, for one thing, be

ashamed to do so, for the conventional book, even for little children, is a rather dignified affair. Moreover, the book would be very, very long. And it is unconventional to print a book, say of 300,000 words, for an eighth-grade class in history, in addition to all the regular historical reading prescribed. Finally, the book would be full of directions to *do* this and that, to work out this or that problem, to write out such and such an outline; and it is unconventional to print such a mixture. These conventions are unfortunate, for easy courses in print are needed. There is no wisdom in the notion that a text-book is to give the subject-matter of a course, but in so difficult a form that every teacher must illustrate and explain it at great length!

Adaptability. Text-books, if written by experts in education, are likely to be the result of thorough consideration of the general facts of the learning process in the case of the subject in question, and so to be better adapted to the general run of pupils than all save exceptionally gifted personal teaching. Personally managed treatment of a subject is, in the nature of the case, more sensitive to the special situations presented by a given group of pupils—their previous knowledge of it and of related facts, their varying abilities, and other individual characteristics. This feature may result in either gain or loss in efficiency, according to whether the teacher adapts the treatment to the special ex-

igencies without neglecting fundamental matters, or, on the contrary, sacrifices general facts in favor of local and temporary interests, the majority of the class in favoi of the specially able or specially deficient, or the proper balance of training in favor of special disciphne to fit his own whims.

Guidance in habit-formation and reasoning. Text-books often state what habits are to be formed without giving the reader exercises in forming them, but this is not a necessary feature of printed matter. Text-books on geography, history, spelling, English composition, grammar, economics, philosophy or sociology could, by the exercise of enough ingenuity, provide for the actual formation of habits in the way that books of examples to be done in arithmetic, or sentences to be translated in Latin, or experiments to be done in chemistry do.

Text-books still less often guide the pupil to think out conclusions himself so far as he can. They commonly give the results of reasoning, and perhaps problems demanding reasoning, but they do not so manage the latter that the pupil is at each stage helped just enough to lead him to help himself as much as is economically possible. They do not, that is, usually get the full value of the questioning, 'developing,' inductive, and experimental methods of teaching.* Nor do they usually give work in deductive thinking so ar-

* These methods wıll be described in the next two chapters.

ranged as to stimulate the pupil to make and test inferences himself.

This fact is partly due to conventional customs. But there is also a real difficulty, due to the fact that pupils cannot be trusted to follow directions. Books could be written giving data, directions for experiments and problems with the data, and questions about the inferences. The student could be instructed to read each helping piece of information, suggestive question and the like only after he had spent a certain time in trying to do for himself what he was directed to do. Such books might be more effective than all but the best tenth of personal teaching, *if students would faithfully try as directed before reading ahead for the helps given.* But they will usually greedily use up all the helps first. If, by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one would page two become visible, and so on, much that now requires personal instruction could be managed by print. Books to be given out in loose sheets, a page or so at a time, and books arranged so that the student only suffers if he misuses them, should be worked out in many subjects. Even under the limitation of the natural tendency of children to get results in the easiest way, a text-book can do much more than be on the one hand a mere statement of the results of reasoning such as an ordinary geography or German grammar is,

or on the other hand a mere statement of problems, such as the ordinary arithmetic or German reader is.

From the point of view of interest in work, personal teaching is usually more sociable, but the difference between it and text-book teaching in this particular could be reduced by skill in organizing the latter.

The evils of rote-memorizing or merely absorptive study on the part of pupils, and of lack of progress on the part of teachers, which are attributed to text-books, are not at all necessary consequences of their use. It is easy to make it more satisfying to pupils to understand than to memorize, and to think than merely to read. A lazy or stupid teacher will not be cured so well by being deprived of all text-book aids in teaching a subject as by being given a dozen such and required to show that he uses them all well.

The misuse of text-books. Finally, many of the evils attributed to the over-use of text-books are really due to misunderstanding and misuse of them. In the case of a good text-book there is a reason for every item and for its position in the whole. Too few teachers know the exact purpose of the text-books they use. Too often a teacher uses a section of a book much as a savage might use a coat to cover his legs; or as a child uses a saw to cut a string, scissors to cut a board, and a padlock as a bracelet.

On the whole, the improvement of printed di-

rections, statements of facts, exercise books and the like is as important as the improvement of the powers of teachers themselves to diagnose the condition of pupils and to guide their activities by personal means. Great economies are possible by printed aids, and personal comment and question should be saved to do what only it can do. A human being should not be wasted in doing what forty sheets of paper or two phonographs can do. Just because personal teaching is precious and can do what books and apparatus can not, it should be saved for its peculiar work. The best teacher uses books and appliances as well as his own insight, sympathy, and magnetism.

CHAPTER IX

Methods in Education

By a Method in education is meant the way in which a teacher puts educative agents and means to work upon human nature so as to produce some desired result. Thus a book may be used as matter to be understood, or to be understood and remembered, or to be merely memorized without understanding, or to be understood, remembered and used in the solution of problems. Thus, to produce the result—knowledge of certain facts in chemistry—the teacher may describe the facts orally, or have students read printed descriptions of them in a text-book, or demonstrate the facts by experiments, or get the students to perform the experiments themselves.

The problems defined.

The variety of methods which one may use to attain even any one given result is often very great, since in the last analysis every difference in the teacher's facial expression or voice, or in the wording of his statements and questions, is a difference in method. The variety possible in connection with all the different results which education seeks is practically infinite. It is, in-

deed, the task of the science of education to study the effect of everything that any teacher can do upon every person to whom anything can be done.

There are, however, certain more or less fundamental differences in methods of teaching which are specially worth study, because the facts and problems which they present concern the teaching of many different things to many different kinds of pupils. Expert opinions on education have thus much to say about:—

Methods for drill or habituation.
Methods for reasoning or analysis.
Realistic *versus* verbal teaching.
Laboratory or experimental methods.
Inductive methods.
Teaching by action and dramatization.

The lecture method.
Object-lessons and demonstrations.
Telling *versus* questioning: The Socratic method.
'Developing' methods.
Education by self-activity.
The method of discovery.

Teaching pupils how to study.

Example and precept.
Imperative, persuasive and suggestive methods.
Evasive, suppressive and substitutive methods.
Reward and punishment.

Some knowledge of the facts and problems referred to by this list is a necessity for understanding books and articles about teaching, and an advantage for understanding one's own work in the class-room.

§ 37. *Methods for Habituation and Methods for Analysis*

To connect the response 14 to the situation, '*How many are 9 and 5?*', is economically done by one set of methods. A different set of methods is needed to give pupils the power to respond appropriately to 1, 5, 7, 17, 31 or any number divisible by no integer save itself and one, or to pick out the essential elements in such a problem as:— $(\frac{1}{32} \text{ of } \frac{3}{8}) \div (\frac{3}{16} \text{ of } \frac{7}{8})$. In forming the habit of responding by obediently doing what a parent or a teacher asks, one set of methods is efficient. A very different set of methods must be used to develop insight by which the essential good or evil in any course of conduct can be known.

Methods for habituation. The methods for habituation may be considered first in the case where the pupil is eager to do his best to form the habit. We have then:—

The Law of Impetus:—James, following Bain, says:—"*In the acquisition of a new habit or the leaving off of an old one, we must take care to launch ourselves with as strong and decided initiative as possible.*" More briefly, *Make the new*

connection with full energy and zeal. The law of impetus is a corollary of the general laws of exercise and effect—that connections persist longest when they are made vigorously and with resulting satisfaction. Hence the law of impetus really applies not only to the beginning, but also to all stages of the formation of a habit. Zeal, interest, going at things with a will, are useful throughout.

The second is the Law of Constancy:—As James puts it, "*Never suffer an exception to occur till the new habit is securely rooted in your life.*" In Bain's words, "*Never lose a battle.*" There are two reasons for the rule of constancy. One is that if a person lets himself deviate from the habit under certain circumstances he may fail to draw the line as carefully next time, and soon come to deviate from it under any or all circumstances. The other is that one failure in ten may cause a loss in self-confidence, not only of one tenth, but even of half.

The third is the Law of Repetition: *Give the habit exercise. Seize the very first possible opportunity and every opportunity to act in accord with the habit, and make opportunities.* The aim of this repetition is, of course, to fix the tendency so that it will persist without further special effort.

These three principles lead to certain other rules when the habit is to be formed under the guidance of a teacher. The law of impetus

teaches the importance of securing the pupil's interest at the start and throughout. and of utilizing, wherever practicable, the energy of some instinct or previous habit as a means to the new end.

These three laws in the class-room.

The law of constancy, the desirability of permitting no reversions, backslidings, or mistakes, leads to two precepts, especially in the case of habits in which the response sought is not so easy, so pleasurable at the time, or so much in harmony with the pupil's general nature, as is the response to be avoided. 1. *Give closest supervision in the early stages of the habit.* For example, in teaching French or German, during the first month have no word pronounced by a pupil until he has two or three times heard it pronounced by the teacher. 2. *In habits of thinking, secure accuracy first, speed later.*

The law of repetition brings up the problem of the amount of special training with a habit, of what teachers call 'drill,' which is needed in any given case, and of the way this training is to be distributed over the series of days during which drill is given. For any one habit in any one person there is an *optimum* amount of drill. Less than this *optimum* leaves the habit insecure, untrustworthy and so of little use; for example, to add correctly nine times out of ten is of little use. More than this *optimum* is wasteful, for very great training makes little or no difference in the habit. For example, after a child comes to write

as well as the samples under 15 on Plate III (following page 214), it takes many, many hours of practice to add one small degree of improvement, and this addition is of little use to anybody.

For any one habit in any one person there is some one best distribution of time over the series. For one habit or set of habits it may be best to give ten drills of twenty minutes for the first week, ten drills of ten minutes the second week, ten drills of five minutes the third week, five drills of eight minutes the fourth week, and one drill of ten minutes each week for three weeks, and then one drill of ten minutes a month for four months. Or it may be best to distribute the 460 minutes in a very different way. Special investigations are needed to find out for various habits the amount of drill that is most advantageous and the best distribution of it.

Four rules of common sense. Four other rules for teaching in the case of habit-formation are worth remembering. They should be obvious deductions from the laws of exercise and effect, but are often neglected. They are:—

Form habits. Do not expect them to create themselves. Do not, for example, expect that ready control of $1/6$ of $24 = 4$, $1/3$ of $27 = 9$, $1/5$ of $30 = 6$, etc., will create itself, once the pupil knows that $24 \div 6 = 4$, $27 \div 3 = 9$ and $30 \div 5 = 6$. Only in the case of the brighter pupils will it do so. Do not expect that a pupil who has, in thousands of divisions by integers, always got an an-

swer smaller than the number divided, will readily learn, in dividing by a fraction less than one, to expect an answer larger than the number divided.

Beware of forming a habit which must be broken later. Thus it is risky or wasteful, or both, to have all silent letters crossed out in the reading-matter for the first and second grades, and to have all the sentences restricted each to one line.

Do not form two or more habits when one will do as well. It is, for instance, better to use the same habit of placing the quotient in short division that will be required in long division, and to use a habit which will serve for extending the quotient to any given decimal. Thus $4\,\overline{|\,648}$ is preferable to $4\,\underline{|\,648.}$

Other things being equal, have a habit formed in the way in which it is to be used. Since the forms of adjectives in German or Latin are always to be used with nouns, they should be learned with nouns. To decline *vir bonus, viri boni,* etc., is far better than to decline *bonus, bona, bonum,* etc.

Methods for analysis. The principles of method in the case of analyzing out an element and giving power to respond correctly to it, regardless of what new situation it may be in, are harder to appreciate and apply. They are:—

1. *Know what the element is that the pupil is to be able to respond to, and what response he is to make to it.* Do not, for instance, expect to

teach a seven-year-old child to respond to the exact characteristic by which $\frac{1}{5}$ of 1, $\frac{3}{7}$ of 1, $\frac{1}{8}$ of anything, $1\frac{2}{4}$, and .026 are all rated as fractions.

2. *Dissociate the element. Do not expect it to emerge into clear thought of itself.* Do not, for example, expect that a pupil will be able to respond to the fact of acceleration because you have told him that it is 'change in velocity.'

3. *Where possible, present the element by itself before presenting the gross total situations in which it inheres.*

4. Where the element cannot exist apart from concomitants:—

   a. *Begin with cases in which it is clear and impressive.*

   b. *Have the pupil compare these with attention directed toward their elements.*

   c. *Have him contrast with them cases similar, save in the absence of the element.*

5. *Provide an instructive name for the element.*

6. *Have the pupil respond to the element in new situations.*

The explanation, illustration and application of these principles make up a large part of the books on methods of teaching.

§ 38. *Verbal and Realistic Methods: The Laboratory Method*

After the experts in getting knowledge discovered that it was far more profitable to ex-

amine real things and observe how they did work than merely to speculate and argue about them, and that it was unsafe to trust the authority of any man's opinion without testing it by its accordance with facts in nature, the experts in education also began to advocate teaching by direct study of things and experimental verification of opinions.

Words versus things.

To hear or read that an island is *a body of land entirely surrounded by water,* or that the subjunctive mood in Latin is used to express *an exhortation, concession or command; a wish; a question of doubt or deliberation; purpose, result, characteristic, and so on,* is not to be taught what an island is or what Latin subjunctives do. Words about things may or may not produce the desired tendencies to respond correctly to the things themselves. There are certain elements of knowledge, certain tendencies to response, which can be got only by direct experience of real things, qualities, events and relations. This fact may, and should, now seem axiomatic, but many teachers in practice forget it, and teachers a few centuries ago rarely thought of it. The increased use of methods whereby the realities are examined and experimented with as well as talked about, enormously improved the teaching of mathematics, science, history and even language.

The wise advocate of realistic methods would not, however, assert that verbal methods were always wrong, or that one should always provide

a pupil as nearly as possible with the direct experience of the reality itself. Different degrees of reality may be desirable,—the actual thing, a model of it, a set of sections of it, a photograph of it, a rough sketch or map of it, a sketch showing one feature of it,—according to the previous experience of the pupil to be taught and the result in him that the teacher intends to secure. It would be absurd to teach the meaning of $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{2}{3}$, $\frac{3}{4}$ and $\frac{2}{5}$ without real objects and groups to be really divided, but it would be equally absurd to teach the meaning of .6542 by dividing real objects and groups each into ten thousand parts and counting out six thousand five hundred and forty-two of them.

Degrees of reality.

Laboratory or experimental methods.

The so-called laboratory methods of teaching represent the combination of the realistic presentation of facts with the observation and verification of principles by the pupil's own experimentation. A laboratory is a place to work with things as well as opinions; experimental methods of teaching are methods of discovery and verification by instructive questioning of nature itself. The essence of the laboratory and experimental methods of teaching is to give as much care and ingenuity to providing instructive experiences of things as to providing instructive verbal accounts of them, to direct what the pupil does as well as what he hears and sees and says, and to teach him to extend, criticize and refine his ideas by

ppeals to fact as well as to some accepted pinion.

Laboratory or experimental methods of teach-ıg depend less upon extensive equipment of in-truments and complicated arrangements for con-olling nature in experiments, than upon the at-tude of open-mindedness and sincere curiosity. teacher may be as prejudiced, dogmatic and edantic with a thousand dollars' worth of brass ıstruments as with a text-book; and a scientific acher can make a pail of water, a hot-air stove ıd a school yard the means of first-rate experi-ents. Indeed, the instructiveness of an experi-ent is commonly in a rough proportion to the mplicity of the apparatus used.

eir misuse.

Like any reform in education, the laboratory method has suffered at the ınds of its friends, by being used indiscrimi-tely and by being over-used. It is not scientific spend two hours in learning by the manipula-ın of instruments something which could be tter learned in two minutes by thought. Wash-bottles, connecting electric wires and putting ay test-tubes, though doubtless useful tasks in ınection with scientific housewifery, are not ıgical sources of intellectual growth. Nor is it e to disregard *what* is taught, so long as it is ıght as an exercise in scientific method. A oratory should teach facts important in them-ves. It is disastrous to scientific habits in the ıng for them to find repeatedly that elaborate

experimental work brings at the end some trivial or meaningless result.

§ 39. *Inductive Methods*

Inductive reasoning is such thought about particular facts or opinions as results in a more general fact or opinion. Thus from the study of particular cases of malaria, one may come to think that cases of malaria in general are due to night air—or that they are due to hot climate—or that they are due to the bite of certain mosquitos. Thus, from the study of particular samples of water, one may come to think that water consists of oxygen and hydrogen always in the same proportions, or reach various other general truths or errors. Inductive methods in teaching are methods of aiding pupils to get general truths from particular facts, and of increasing their power to do so.

Essential features. Successful inductive methods (1) make the issue or problem to be solved clear, (2) present enough and representative particulars, (3) arrange these conveniently for examination, help the pupil (4) to compare them from instructive points of view and (5) to see the feature they have in common by contrasting with them other particulars like them save in that feature, (6) stimulate him to frame a generalization or hypothesis or answer to the problem as a result of the comparison and con-

trast, (7) lead him to verify this rule or hypothesis or answer by the test of other facts or by appeal to trustworthy authority, and (8) practice him in using it in new applications.

These essential factors are often grouped as five successive steps in teaching—Preparation, Presentation, Comparison, Generalization and Application—called the Formal Steps in Instruction. Under *Preparation* would come (1) making the issue or problem to be solved clear and putting the pupils in a proper position to attack it. Under *Presentation* would come (2) presenting enough representative particulars and (3) arranging them conveniently for study. Under *Comparison* would come (4) and (5)—helping the pupils to compare these facts from instructive points of view and to bring out their essential feature by contrast with other facts like them save in the absence of this feature. *Generalization* and *Application* refer to (6) and (8) above. Verification should be provided for in connection with Application, or be added in the sequence, between Generalization and Application.

Illustrations of these. Suppose, for example, that one is to teach multiplication by a two-place number by inductive methods. (1) The issue or problem to be solved would be made clear by setting such questions as:—An army is made up of 34 battalions. Each battalion has 216 men. To find a quick way of telling how many men there are in the army? (2) Several such prob-

lems should be solved as samples lest the pupils think of the procedure as applicable to only the one problem. They should represent carrying and not carrying in the partial products, and the forms $\begin{array}{r}\text{ooo}\\ \underline{\text{ooo}}\end{array}$ $\begin{array}{r}\text{oooo}\\ \underline{\text{ooo}}\end{array}$ and $\begin{array}{r}\text{ooo}\\ \underline{\text{oooo}}\end{array}$, lest the pupils get some other feature in place of the *right-hand figure of each partial product under the figure used in multiplying to get it.* The various difficulties that come from 0 in the multiplier or multiplicand would, however, be left for later separate treatment. (3) These examples may be made convenient for examination by repeating the 216 in the multiplicand, and otherwise reducing the difficulty of getting the partial products themselves, so that attention can be given to *placing* them. For example:—

$$\begin{array}{r}216\\ \underline{34}\end{array}\quad\begin{array}{r}216\\ \underline{32}\end{array}\quad\begin{array}{r}216\\ \underline{36}\end{array}\quad\begin{array}{r}216\\ \underline{31}\end{array}\quad\begin{array}{r}216\\ \underline{39}\end{array}\quad\begin{array}{r}216\\ \underline{82}\end{array}$$

(4) Comparison from instructive points of view will be assisted by having the pupil do the above examples followed by such a series as:—

$$\begin{array}{r}216\\ \underline{33}\end{array}\quad\begin{array}{r}231\\ \underline{21}\end{array}\quad\begin{array}{r}412\\ \underline{21}\end{array}\quad\begin{array}{r}248\\ \underline{24}\end{array}\quad\begin{array}{r}235\\ \underline{23}\end{array}\quad\begin{array}{r}243\\ \underline{22}\end{array}\quad\begin{array}{r}209\\ \underline{44}\end{array}$$

This, by making the computation very easy and by using 33, 22, 44 as multipliers, accentuates the place-values of the second partial product. The

same end is forwarded by such an exercise as writing in the missing numbers in the case of statements like:—'When I write the 8 of 648 under the 3 of 34 (or 32, or 36, etc.) the 648 counts as __ in adding,' and by such a series of exercises as:—

A.	$10\times 2=$	B.	$30\times 23=$	C.	$30\times 215=$
	$10\times 6=$		$20\times 24=$		$30\times 312=$
	$10\times 23=$		$40\times 12=$		$30\times 217=$
	$10\times 24=$		$20\times 123=$		$30\times 216=$
	$30\times 2=$		$30\times 132=$		$20\times 216=$
	$20\times 2=$		$30\times 211=$		$40\times 216=$

D.	$2\times 23=$	E.	$20\times 27=$	F.	$40\times 22=$
	$20\times 23=$		$40\times 27=$		$10\times 26=$
	$200\times 23=$		$60\times 14=$		$300\times 26=$
	$3\times 23=$		$40\times 14=$		$30\times 26=$
	$30\times 23=$		$20\times 48=$		$40\times 17=$
	$300\times 23=$		$100\times 48=$		$400\times 17=$
	$30\times 27=$		$20\times 36=$		$70\times 12=$
	$300\times 27=$		$200\times 36=$		$700\times 12=$

(5) Contrast is employed by the use of 22, 33, 44, 32, 23, etc., in the multiplier, as was noted.

(6) The rule may in this case be explicitly framed in words by the pupil, or left as a principle of action.

(7) The process may be verified by actually adding, in two or three examples like 13×435 or 14×62, where the addition is not too long, and in

other ways besides the customary verification by the authority of the teacher or the answer-list.

(8) The principle would be applied in further problems.

Contrast with teaching only the results of reasoning.

Inductive methods are contrasted, on the one hand with mere learning of the *results* of reasoning, and on the other with *deductive* methods, whereby the teacher leads (or tries to lead) the pupil to think out the answer to the problem at hand from some general principles. In the illustration chosen, mere learning the results of reasoning might be represented by the following:

Multiply 3457 by 23.

MODEL:	3457	Multiply 3457 first by 3, and
	23	write the product. Next, mul-
	10371	tiply by 2. Two 7's are 14.
	6914	Write the 4 under the 2. After
	79511	completing the multiplication
		by 2, draw a line and add the
		products.

Contrast with deductive methods.

A deductive method of teaching would be one which led the pupils to reason out from the facts of decimal notation, or at least to understand, more or less of the following or its equivalent:—

(1) Since any digit in the tens place represents that number of tens, and since $a \times b \times c = b \times a \times c$, any number, c, multiplied by any number

of tens, a, will give the same result as if c were multiplied by a and the resulting product multiplied by 10. But to multiply by 10 is to make all the units tens; all the tens, hundreds; all the hundreds, thousands; and so on. Hence, to multiply by any multiple of ten, multiply by the digit representing that multiple, as if it were in units place, but write the units of the product in the tens place, the tens of the product in the hundreds place, and so on.

(2) Now, since $(a+b)\times c=(a\times c)+(b\times c)$, the product of any number, c, and any two-place number will be the sum of the products of the number c when multiplied by the largest multiple of ten and by the smallest multiple of one which, if added together, make that two-place number.

(3) Hence, to multiply by any two-place number, multiply as in short multiplication, by the smallest multiple of one; multiply as shown in (1) by the largest multiple of ten, the sum of these multiples being the two-place number in question; add the products.*

Two-place multiplication was chosen deliberately to illustrate inductive method and deductive method because it can reasonably be taught in either way or as a mere learned fact. Indeed, the

* The deductive methods of teaching two-place multiplication in vogue in text-books of elementary arithmetic do not teach the entire process deductively More or less of it they give outright as a result of reasoning to be learned as a habit

mere mechanical learning of the procedure may seem to many the most economical method. It should, however, be noted that such mechanical learning is really inductive, the generalization coming after much drill and being in the form, 'This procedure is right because it always gives the right answer,' the teacher's word or the answer-key being the means of verification. It should also be noted that the inductive method of teaching the subject need take no more time, since the time is spent in doing examples equally profitable for drill.

Illustrations could have been found in which inductive methods, deductive methods and mere learning results would, one or the other, be obviously superior. Thus the meanings of one third, one fourth and one fifth are best taught to second-grade children inductively from the examination of apples, cakes, lengths, volumes, and groups of objects, so divided. The meaning of one forty-eighth or one twenty-third, if taught at all to fifth-grade children, should be taught as a deduction from truths already known about fractions. The fact that certain large bodies of land are called continents should be learned as a mere result.

§ 40. *Expressive Methods*

The original and fundamental form of learning, in the child and in the animal kingdom as a whole, is by connecting actual movements of the

body with the situations which life offers. And all through life, for most men in most situations when previous habits do not decree otherwise, the 'natural,' favored sort of response is to make one or another actual movement. Indeed, much that we think of superficially as pure thought is rooted in and accompanied by actual motor responses. The partial excitement of the vocal cords and mouth-parts in inner speech often accompanies so-called silent reading. The eye muscles become tired in mentally multiplying with examples like 247×863. Attention is a state of body as well as of mind.

Now it is likely that a restriction of muscular action in schools to the movements of the head and eyes in attending, of the fingers and eyes in writing and of the vocal cords and mouth-parts in speech, is far too narrow. Gesture, facial expression, mimicry and other dramatic movements, dancing, drawing, painting, making maps, models, and other constructions, probably all can be used to good advantage in getting, applying and testing knowledge and appreciation, as well as in acquiring desirable forms of motor skill itself. The expressive methods of teaching stand for the acceptance and exploitation of these probabilities. They rightly claim that for a pupil to use only words in his responses is as risky as for a teacher to use only words in his stimuli. In general, the arguments that hold for the use of concrete realities in impression upon the pupil, hold for the use

of manual construction, dramatic action, drawing, modeling and the like in expression by him. The caution against over-technicality and elaborateness in object-lessons and laboratory methods holds for the expressive methods as well. It is not the mere dancing or drawing or acting, much less the intricacy of its technique, that constitutes the merit of the expressive methods. Means and ends must not be confused.

CHAPTER X

Methods in Education (*concluded*)

Lecturing, object-lessons, questioning, the so-called 'developing' methods, and the method of discovery, may be grouped together because they all concern the extent to which the teacher should try to tell or show the pupils facts which they could find out by themselves.

§ 41. *Telling and Showing: Lectures and Demonstrations*

The lecture and demonstration methods represent an approach to a limiting extreme in which the teacher lets the pupil find out nothing which he could possibly be told or shown. They frankly present the student with conclusions, trusting that he will use them to earn more. They ask of him only that he attend to, and do his best to understand, questions which he did not himself frame and answers which he did not himself work out. They try to give him an educational fortune as one bequeaths property by will. The same theory of giving facts to work with later, rather than inciting the student to use what he

has already, is at the bottom of much that is printed in text-books, or done in object-lessons, excursions and the like. A map, a dictionary, a table of logarithms, or a chapter in an ordinary history, are clear cases of the lecture-demonstration or 'telling-showing' method.

The 'telling-showing' method is by far the commonest in use in schools and books, but is criticized by educational experts. The two chief disadvantages which they find in it are:—that the student may hear or see but not understand; that he does not learn how to think—how to discover a problem, a means of attacking it and its solution—how to get facts, and further facts out of them.

These defects are not, however, necessary features of the method. A student is less likely to understand what is simply given to him than what he works out for himself, but he may. A student may also be provoked to think by information given as well as by a problem set,—by answers as well as questions. In some cases, indeed, the very best way to induce the mind to think for itself is to give it facts to think with and conclusions to justify, compare or increase.

The chief excellence of the 'telling-showing' method is economy. In some cases this advantage alone justifies its use. For example, it would be absurd to spend the time necessary for a pupil to reason out what *ja, nein,* and *Pferd* mean, how many legs a spider has, when George Washington died, or the value of π.

§ 42. *Questioning*

Telling is, however, certainly only a small part of teaching. A man who could state facts with perfect lucidity, in the clearest and most logical sequence, fitting the information at every stage to the previous experience of the student, would still be far from a perfect teacher. Knowledge of human nature and practical experience in schools agree in emphasizing the value of questioning.

Its advantages. **Verification.** The questioning method has three main advantages. It keeps the teacher and the student informed of what the latter does and does not know—can and can not do. The teacher by it verifies the results of his previous work, as a scientific man verifies his theories by actual observation and experiment. He learns what changes have been made in the students, and what remain to be made, and so is guided in what he does or says next. The student by it is kept informed of where he has succeeded and where he has failed, and is guided in his own further study.

Definite aims. Besides this advantage of constant examination of those who are being taught and the consequent verification of the results of teaching, the questioning method helps to put the students in the attitude of facing issues, solving problems, and working over situations to

get effective responses to them. Such active attacks upon problems are important means of intellectual progress. In Dr. Earhart's words, ". . . The recognition of a problem is the first factor in proper study. . . . This problem must be felt as such by those who are to study, or else the motive and guide for thought are lacking. . . . In order that the thinking may be accurate, the problem must be clearly defined in the mind of the person who is to do the thinking."*

The active use of previous knowledge.

In the third place, the questioning method, properly used, gives students a better chance to do as much as they can themselves, to use the knowledge and insight which they already have in acquiring more. It is desirable for many reasons for students to recall a fact from within instead of receiving it from without, to create the right inference from certain premises instead of accepting it as right when it is given by another, and to select the essential element out of a complex situation by one's own trials instead of merely learning that it is the essential one. The chief reasons are:— that interest is increased, so that the work is done with less strain and waste; that the resulting changes in the student are more permanent; that the changes made are, in and of themselves, better. The last is the most important. Since we tell a pupil that six threes are eighteen only in order that when asked how many six threes are he will

* *Teaching Children to Study,* p. 22.

know, it is safer to have him face that question and get the answer, say, by adding a column of six threes. He thus gets not only the answer, *eighteen,* but also the habit of using his knowledge of how to add.

§ 43. *Developing Methods*

Helping pupils to help themselves.

What is meant by a 'developing' method can be seen best by illustrations. Suppose the problem set is, *What are the chief products of Minnesota?* Suppose the teacher, instead of either telling the facts outright or blankly asking the question, puts such a series of questions and suggestions as these:—Think where Minnesota is. Draw it on this outline map of North America (on the blackboard). Name some things that won't grow there easily or at all. Think of the maps you made of the corn-belt and wheat-belt in America. Which belt took in Minnesota? Think of the maps I showed you of the chief deposits of gold, silver, copper and iron ore in the United States. Who is sure that he knows the chief States for producing gold? Silver? Copper? Iron? Each one of you may write down one thing, besides wheat and iron ore, that you think Minnesota produces in large quantities, and the reason why you think so. John may look in the index of this book about Minnesota to see if the book tells what the chief products are. Helen may look in

the *Statistical Abstract of the United States* to see if we were right about rice and cotton and tobacco and wheat and iron ore.

The developing method means substantially getting the pupil to do more for himself by doing something for him,—more for himself than he would do if either everything or nothing were done for him. It might be better named the method of *stimulating helps,* that is, of helping pupils to help themselves.

The help may be given by questions, suggestions, objective demonstrations, gestures, facial expression or in many other ways. It may take the forms:—of starting him on a useful series of associations, of arranging the order of a series of problems for him, of narrowing the field in which he is to search for an answer, of suggesting a field in which to look for it, of supplying a needed fact outright, or of many other directing acts. It is not so much an opposite of telling or questioning as a modification of both, whereby the pupil is led to do more for himself. It is, as was just said, well described as the method of stimulating helps.

§ 44. *The Method of Discovery*

The method of discovery carries the reaction against merely giving pupils the results of other men's experience and thought to the extreme of declaring that each pupil should learn facts in

the way that they were learned by their original discoverers. If this doctrine is taken literally, however, it becomes absurd. One would, for example, have to create a primitive environment in which fire was unknown save as an accident of nature, in order to have the child discover the art of making fire, by rubbing sticks and the like, as it was originally discovered. If, by any lucky chance, he did discover what millions of men lived long lives without discovering, he still would have to be excluded from all experience with flint and steel, matches, electric sparks and the like, until by a series of lucky chances he repeated the triumphs of the world's great scientists and inventors! It would be enormously costly thus to deprive children of the advantages of civilization, and would be the height of folly, even if it could be done at no cost.

Extravagant hopes of originality in children.

The starting-point for children's supposed 'discoveries' is the very advantageous one of an elaborate general experience of many of the facts to be discovered. They also start with problems so framed as to be half answered. One of the hardest things in the original discovery was getting the question itself. Given the questions—*How to make fire at will?*, or *How many are six and six?*, or *How can we go on the water in what direction we will?*, or *Is static electricity the same as lightning?*—and a very great advance is already made toward the answers. One important symptom of

intellectual greatness is the power to frame new, significant, answerable questions. Now in practice the advocates of leaving children to rediscover facts always give them not only the general preparation of crude acquaintance with the facts of civilized life, but also *the questions* as starting-points. Children are never left to discover the sciences and arts as they were originally discovered. They are always given advantageous knowledge and help in seeing what the problem is.

Discovery can, at most, mean only active search.

But, even with these modifications, the requirement that pupils actually rediscover facts is still absurd. If they had such capacities, it would be far better to set them to discovering *new* facts, which would be more educative for them and infinitely more useful to the world. If they are able to discover the alphabet independently, they should be able to discover improvements on it; if they can rediscover the cause of tuberculosis, let them discover the cause of cancer! Of course, save for the few individuals of great gifts, they do not, no matter what we pretend, rediscover important facts. At the most, they discover facts as one might be said to discover a piece of gold who was taken to a plot in which it had been buried, not too deep, and told, "Dig around here. You will probably find something of value."

The method of discovery at its best is, in fact, a very bad title for *methods in which the pupil is left to his own efforts so far as he can be without*

too serious detriment to the quantity and quality of the information and skill that he gets. Such methods are good in proportion as they avoid such detriment and encourage the intellectual virtues of persistence, ingenuity and scientific method. But they are not methods of teaching through actual discovery.

At its worst, the method of discovery is a name for pretense that the child is cultivating powers of originality and self-reliant investigation, while all the time the facts are being smuggled into his possession as truly as in straightforward 'telling.'

§ 45. *Teaching Pupils How to Study*

What 'studying' ought to mean.

Teaching pupils how to study—or better, how to educate themselves—is obviously as important as teaching them to know certain facts and to do certain things. The willingness and ability to study efficiently—to educate oneself well—involves (1) having purposes or aims, (2) putting questions to oneself, (3) bringing to bear upon any problem whatever relevant facts one knows, (4) organizing these facts according to their bearings upon the problem, (5) searching for more in the writings of men competent to inform one about the problem in question, (6) judging the merits of the suggestions thus received, (7) observing and experimenting in first-hand contact with facts, (8) economizing time and energy in the triple task of

forming habits, acquiring skill and memorizing what is permanently needed, (9) using the knowledge or skill or interest when it is gained, and cherishing ideals of open-mindedness, fairness, accuracy, thoroughness and caution.

Good teaching forms good habits of study. It is, in general, true that methods of teaching which help pupils to learn well also help them to study well. The methods that are best to develop sound knowledge of arithmetic in a pupil will, as a rule, be the best to teach him how to study arithmetic. If by sound knowledge is meant knowledge in the long run, this identity of excellence in teaching a subject and in teaching how to study it is probably universal. But it is possible, by focussing attention upon immediate facility, to choose methods of teaching that are excellent for that, but defective for the more important service of arousing in a pupil the desire and power to educate himself. Even gifted teachers often, in commendable zeal for interest and economy of time, prepare pupils in advance for every chapter to be read by outlining it, eliminating all difficulties, and accepting the ability to give the substance of the chapter as all that the pupils are to do. The pupils may be left unable to study a book intelligently by themselves. If they had been given problems to work out with its aid that were just within their capacity, they might have absorbed its substance less easily, but would have gained a more valuable knowledge of its relations and

uses, and also have had some training in the independent use of books.

§ 46. *Methods in Moral Education*

Example and precept.

A teacher, confronted with the task of getting a pupil to be or do this or that, often acts as habit suggests, *asking* or *telling* the pupil to be this or do that. 'Be attentive,' 'Please speak clearly,' 'Think hard,' 'Hold the pen lightly,' 'Don't talk through your nose,' and the like, are the means which habit is likely to make one use. Experience, however, teaches us all that personal example is often superior to advice and orders, because the model given tells the pupil more clearly what to do or makes him more disposed to do it. In morals, manners and the more delicate features of skill, example has thus special advantages over precept. For the teacher to possess the quality to be taught and to secure from pupils the attitude of respect which is the soil in which imitation flourishes, is thus an important part of method in teaching.

Imperative, persuasive, and suggestive methods.

A simple order has no power, in and of itself, to produce action. Only in so far as habits of doing what one is told to do have been built up, does the mere imperativeness of the order effect anything. Otherwise it simply proposes to the person the project in question, his response to it being a result of favoring and opposing impulses.

To produce and prevent these is the function of argument and suggestion. Both argumentative and suggestive methods of teaching and management try to produce favoring impulses, though the latter do so somewhat more subtly.

Their proper uses. The essential difference between them is that between overcoming contrary impulses or ideas and preventing them from appearing at all. Each method of securing belief or action of a desired sort has its special advantages. Successful persuading conquers a difficulty instead of avoiding it, and so may put the person educated in a better permanent condition. Children, or adults, who have been habitually hoodwinked into virtue may lack stability against their own original impulses and the evil suggestions of others. On the other hand, the arguments which are used in persuasion, though valid, may be ineffective, or even incomprehensible to the person in question, so that the choice is between suggestion and brute compulsion. It is, for example, commonly futile to argue with a five-year-old in favor of temperance in eating. The skill in maintaining order among little children which a teacher acquires by experience is made up to a large extent of devices, often unconscious, of voice, bearing, words and so on, that have proved successful as suggestions.

When, by defect in original nature or previously formed habits, an undesirable response is made to a situation,—for example, the response

of bullying to the situation *a weaker playmate*,—there is the choice among these three methods.

Evasive, suppressive, and substitutive methods. (1) The situation may be evaded in the hope that by lack of exercise the bad instinct or habit will die; thus the bully may be kept away from younger children. (2) The wrong response may be suppressed by making it result in discomfort; if every act of bullying brings prompt misery to the bully, the tendency will weaken. (3) Some other response to the situation may be substituted for the wrong one, or the wrong response may be connected with a situation where it is appropriate, or both of these directive changes may be made together. Thus the bully may be taught to use up his surplus energy in carrying the weaker playmate on his back or in boxing with him, using only one hand. Or he may be taught to attack other bullies, or to use the hunting, attacking, triumphing responses in some appropriate systematized game like football. Or he may be taught to do both.

The advantages of substitution. The substitutive or directive methods have the very great advantage of providing some positive good tendency in place of the bad one, instead of simply avoiding or suppressing it; and of utilizing the energy of the individual instead of leaving it dammed up ready for mischief. They can also be used to prevent bad tendencies beforehand as well as to cure them after they appear. Alone, or in various combina-

tions with evasion and suppression, they are the mainstay of moral training. The history of education is marked by the total or partial abandonment of evasion and suppression in favor of re-direction in one after another field of human conduct. And one may prophesy that the principle will find useful applications in new directions—for instance, that a useful cure for injustice in business will be found in higher schools of business administration, whereby the crude tendencies to respond to the situation, *a business opportunity,* with acts productive of success at any cost, will be replaced by tendencies to do the work in question as efficiently as possible in the spirit of science. Similarly, a useful preventive of war between nations will be to habituate nations to positive cooperation in enterprises for the common good, such as charting the seas, exterminating contagious diseases, establishing international courts and international police, arranging for the migration of students and teachers, and the like.

Reward and punishment. The selection of good responses by associating their connection with appropriate situations with satisfaction is in general preferable to the elimination of bad responses by pain or deprivation.* It is true that if an animal

* Where the desired response is simply *not to do* a certain thing punishment is very useful. When there are only two alternatives, to do A or to do B, A being wrong, punishment is fairly effective. When there are many possibilities, A B C D . . . N, which are of varying merit, punishment is likely to be very wasteful.

learns to respond correctly from the infliction of pain, it may learn rapidly. But there is a strong tendency for an animal, if punished for a given response, not to avoid it in favor of the right one, but to avoid making any. The more intense the punishment, the more likely this is to be the case.

These general principles are, however, complicated in the practical exigencies of education by differences in the situations and responses concerned, in the kind and degree of punishment or reward, in the influence of the method upon opportunities for deceitful avoidance, and in the degree of maturity and individual peculiarities of the individual. Hence to find the best incentives and deterrents, and to choose between incentive, deterrent or mixture of the two, becomes in any particular case an intricate problem for psychology and experimental education. To hit a baby's hand every time that it starts to reach for some improper object on a table can be shown to be useful; but to hit a child's hand because a blot is found upon his sheet of writing can be shown to be wasteful as well as cruel. The detailed facts which should be at the basis of particular choices of incentives and deterrents cannot be reported here.

CHAPTER XI

The Results of Education

§ 47. *The Results of Education as a Whole*

The results from education in the broad sense of *all human endeavor to change men* are easy to see, though hard to measure. Thus we see the introduction of Western knowledge and skill transforming Japan, and will see it transforming China. Thus, by being changed from creatures who regarded diseases as accidents or punishments from angry gods, to creatures who know them to be the natural and predictable consequences of the invasion of the body by the Klebs-Loeffler bacillus, the failure of the body to make enough red blood corpuscles, the presence of parasites carried by a stegomyia or anopheles mosquito, or the inefficiency of the thyroid gland, men add years to their lives, change fundamental habits of food and shelter, and begin to elevate religion above a bargaining with God.

Education is effective.

Its results are often permanent.

The changes produced against great resistance in one generation often become easy of accomplishment in the next. When once a belief or custom is accepted by men, its inculcation into their children is

favored instead of hindered by intellectual inertia. It would be almost as hard for a child in America to-day to continue thinking that the world is flat as it would have been for a child in Europe in 1300 to have learned that the world is a sphere. A body of knowledge, customs and attitudes, once acquired, may thus continue century after century, rolling up like a snowball. We speak, count, draw, live in houses and cook food so easily under the slight pressure of unconscious education that we are likely to forget that none of these activities is present in original nature—that all are the gifts of education.

They become fixed in things and institutions. The results of education persist also by being embodied in changes in the world of things. Education makes some change in the habits and ideas of men; this change in turn causes an engine to be built, a book written, an orchard planted, a picture painted. The engine, book, orchard or painting, in turn, is an educative force acting upon men. The changes which man makes in himself may be effective not only in the ideas and customs which his children adopt easily, but also in the altered environment he leaves behind him. The changes man makes in himself would often avail little without those which he makes in the world about him. The two sorts are subtly and closely dependent one upon the other. Both together represent his legacy to mankind, a legacy without which our children would lead lives, supposing that by a miracle they

could keep alive at all, of degradation and wretchedness far below that of the most uncivilized African tribe.

But not in the germ-plasm. It might be expected that the results in intellect, character and skill produced by education in one generation would directly affect the next generation by hereditary transmission. It is plausible to suppose that the successful study of mathematics for ten generations would produce, in the germs which make the eleventh generation, at least some slight tendency which would develop, as the germs grew into human beings, into an ability to learn mathematics more easily than did the first generation. But this is false. The evidence is all against the theory that the special knowledge, interests, habits, skill, or morals which a human being acquires during life will alter his germs so that the children developing therefrom will be any the more likely to possess or acquire that special knowledge, interest, habit, or skill. Even though for thousands of generations men should all learn that $(a+b)\ (a-b)=a^2-b^2$, the thousandth generation would probably have no greater readiness to connect these two ideas.

The same failure of results in intellect and character to change the germs in favor of similar results in future generations probably holds of the more general elements of human nature, such as acquired courage, persistence, accuracy, truthfulness or kindness. There is no evidence that

these broader lessons of life do, and no way known by which they could, increase the basis of courage, persistence, or kindness in the germs.

With some possible exceptions.

For hereditary racial improvement by education in general health and vigor there is more hope. In so far as the entire man is kept free from enfeeblement and decay, the germs too may perhaps be kept from degeneration. But even here there is little surety. For the germs lead an isolated and protected life. To half starve a man may perhaps not injure his germs; his mental idleness and debauchery may perhaps in no wise corrupt them. It is by no means certain that even so potent debilities as excessive acquired alcoholism or morphinism, which impair almost every part of man's make-up, produce measurable harm to the germs.

What his offspring will be depends upon what the germs of a man are, and so upon what he does with himself only in so far as his conduct reacts upon them. Original nature comes from original nature: inheritance is from the germs to the germs. Long before a man is born, the germ-cells that will thirty years later produce his children are set off apart. They do not come from him as a collection from his total make-up, but from the germs that produced him. Whatever nature he originally had, they tend to have; what traits he has acquired by education, they need not have at all. The history of a child's mental and moral inheritance runs back through the original

natures of his ancestry as shown in Figure 10, with only such doubtful accessions or impairments from their acquired natures as were described in the last paragraph.

Selection, not training, improves the stock itself.

Education then improves directly the conditions under which the race is to live, but can improve the race itself only indirectly. It improves the race indirectly in so far as it teaches man to breed men, as he does plants or cattle, by finding out what the best stocks are and selecting them as the parents of the race that is to be. Such improvement of the race has as yet hardly been attempted. Indeed, many intelligent men and women still feel a superstitious dread of tampering with the question of who shall be born, though no other question so deeply affects the welfare of man.

§ 48. *The Results of School Education*

Far too little is known of the results in knowledge, power, skill, interests and ideals, that come from any given sort or amount of school education. What difference it makes whether one goes to school a thousand days or two thousand; whether the teachers by whom one is taught are paid five hundred dollars a year or a thousand; or whether one studies Latin or English—to all such questions no exact answers have been found. In a rough way,

Are hard to measure.

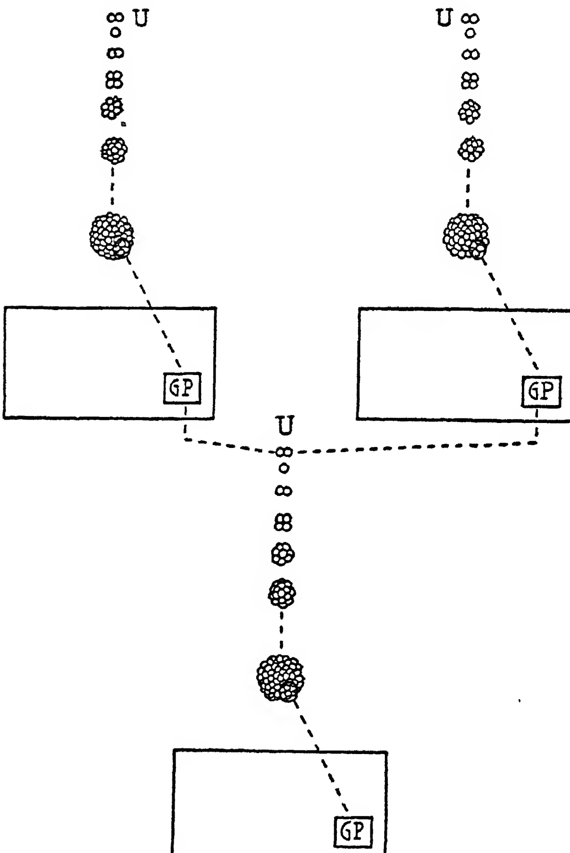

FIG. 10.

FIG. 10. A graphic representation of the hereditary relation between successive generations. The rectangles represent adult human beings, those portions of each marked *G P* representing the germ-plasm of that

sagacious parents, teachers and observers of school education could estimate the gain made by a child, a class, children at large. But such estimates would be subject to large errors.

The effects of selection and of training are confused.

It is not difficult to compare those who have had a given sort or amount of education with those who have not. But such comparisons do not measure the effect of the education in question alone. The other things are rarely equal. Thus, supposing it to be true that, at thirty, high-school graduates earned two thousand dollars a year, while those who stayed in high school only a year or less earned one thousand at the same age, the doubling of earnings cannot be credited to the education given by the last three years of high school until we are sure that the two groups were equal in native ability and social advantages. As a matter of fact, we can be sure that they were *not* equal. For a boy to graduate from high school means that, *when he entered,* he differed from his fellow-students who remained in high school only a

individual. The union of the male germ-cell and the female germ-cell is shown at *U;* the growth therefrom of the adult form in successive stages by the splitting into two, four, eight, etc., cells is shown from *U* downward. The course of the dotted lines illustrates the fact that the germ-plasm of one generation comes from cells set off early in the growth of the generation preceding, and the fact that the line of inheritance is consequently *from germ-plasm to germs to germ-plasm to germs,* not from the body as a whole to the germs to the body as a whole to the germs.

year or less. In the case of a thousand pupils in the New York City high schools some of the differences between the pupils who graduated on time and those who left high school within four months after entrance were as follows:—

Samples of the selective action of schools.

Those who remained to graduate on time were three quarters of a year younger, and included less than a fourth as many children of Irish parents and nearly one and three-fourths times as many children of Jewish parents. They reported at entrance that a high-school education was necessary for their intended life-work, two and a half times as frequently; and that they intended to complete the course, four and a half times as frequently. In the work of the first months they were esteemed by their teachers far above the other group in both ability and industry, and got, in the formal records of the school for scholarship, grades averaging eighty to the others' sixty. Only one in fifteen of them got an average grade for the first term's work below sixty, while half of those who left school did so.

We cannot measure the results of a certain form of education by comparing those who have had it with those who have not, unless the other conditions are all equal; and they almost never are. Any form of education acts by selecting certain individuals as well as by training them. Two groups—the graduates of a law school and those of an engineering school—were unlike

when they entered, and indeed when they were boys in short trousers—probably even when they were born. It will be found, for example, that the former in the elementary school commonly preferred history to science, while the latter preferred science to history. Children who went to school two thousand days will be found to have been from the start more interested in scholarly work, and more capable at it, than those who went only one thousand days. The young men who learn the carpenter's trade are selected by its attractions, and are different from those who are selected by the different attractions of clerical work. Different forms of education select different sorts of men as well as make different changes in them.

Results from training alone are complex.

Apart from this confusion of the differences made in men by education with the differences already present in them, there is the further difficulty that the changes made are so complex. A list could easily be made of a hundred interests, abilities and habits which an elementary-school education might fairly be expected to influence. Its full effect upon some of them might also not appear until years after school life was past. Its effect, in any case, has to be separated from that of the mere inner growth of the mind which comes with age. Its effect varies with each pupil subjected to it, in accord with his individual peculiarities.

It is then no wonder that all manner of dis-

putes should arise about the value of this or that form of school education, and that wise students of education should be eager to see the same patient, minute, impartial measurements made of the results of teaching that scientific men make of the results of physical and chemical activities. Even greater patience and ingenuity are needed in the case of education, because of the subtlety and complexity of the changes in human nature and of the forces which work to produce them.

§ 49. *Means of Measuring Educational Products*

One important step in exact scientific study of educational products is to get units and scales to measure them by. Physics could not have progressed to its present knowledge about the movement of bodies in space if its only scales for length and weight and time had been *short, long, very long,* and *light, heavy, too heavy to lift, too heavy for two men to lift.* Replacing the old scale of *freezing, cold, tepid, warm, hot, hot as boiling,* by the thermometer, helped largely to create knowledge of heat. So scales to measure such educational forces as the teacher's interest in his work, or the ingenuity of his questions, and such educational products as knowledge of arithmetic, enjoyment of music, ability to write English, ability to manage wood-working tools, and the like, are much needed.

As samples of the beginnings made toward the study of school achievements, I show parts of two such scales, one for children's handwriting, the other for English writing by pupils in their teens. This 'graphometer,' as we may call it, and this 'composition-meter' are crude but very useful.

Two sample scales for educational measurements.

In the graphometer, or scale for measuring the quality of children's handwriting, points or qualities 0, 5, 7, 9, 11, 13, 15 and 17 are shown. In so far as the sample shown for zero represents handwriting with just not any merit, the other samples are a scale for merit in handwriting in the same way that $5, $7, $9, etc., are a scale for purchasing power, and in almost the same way that a series of lines 5, 7, 9, etc., inches long would be a scale for length. Any handwriting to be measured is compared with the scale and given a number accordingly.

The 'composition-meter,' or scale for merit in English writing by pupils in their teens, consists similarly of a zero-point and of points at various exactly determined distances above this zero. Thus, quality 77 is as far above quality 67 as quality 47 is above quality 37. A composition that is regarded by impartial judges as of the same merit as the specimen representing point 93 is twice as good as a composition of quality 47. Wherever this scale was used, a mark of 40 or 60 or 80, if given without bias, would mean a

known degree of excellence in paragraph-writing, just as 80 pounds means a known degree of weight wherever the avoirdupois scale is used. By using such scales, the absolute gain which any pupil made in any year could be measured in the same way as his gain in height, weight, wages or pulse-rate, and the results of different means and methods of teaching could be demonstrated with exactitude instead of being guessed at.

A Scale for Merit in English Composition by Young People*

0

Dear Sir: I write to say that it aint a square deal Schools is I say they is I went to a school. red and gree green and brown aint it hito bit I say he don't know his business not today nor yeaterday and you know it and I want Jennie to get me out.

18

the book I refer to read is Ichabod Crane, it is an grate book and I like to rede it. Ichabod Crame was a man and a man wrote a book and it is called Ichabod Crane i like it because the man called it ichabod crane when I read it for it is such a great book.

* This scale is the work of Professor M. B. Hillegas, of Teachers College, Columbia University, to whom I am indebted for permission to quote it here.

26

Advantage evils are things of tyranny and there are many advantage evils. One thing is that when they opress the people they suffer awful I think it is a terrible thing when they say that you can be hanged down or trodden down without mercy and the tyranny does what they want there was tyrans in the revolutionary war and so they throwed off the yok.

37

Sulla as a Tyrant.

When Sulla came back from his conquest Marius had put himself consul so sulla with the army he had with him in his conquest siezed the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded.

47

De Quincy

First: De Quincys mother was a beautiful women and through her De Quincy inhereted much of his genius.

His running away from school enfluenced him much as he roamed through the woods, valleys and his mind became very meditative.

The greatest enfluence of De Quincy's life was the opium habit. If it was not for this habit it

is doubtful whether we would now be reading his writings.

His companions during his college course and even before that time were great enfluences. The surroundings of De Quincy were enfluences. Not only De Quincy's habit of opium but other habits which were peculiar to his life.

His marriage to the woman which he did not especially care for.

The many well educated and noteworthy friends of De Quincy.

58

Fluellen.

The passages given show the following characteristic of Fluellen: his inclination to brag, his professed knowledge of History, his complaining character, his great patriotism, pride of his leader, admired honesty, revengeful, love of fun and punishment of those who deserve it.

67

Ichabod Crane.

Ichabod Crane was a schoolmaster in a place called Sleepy Hollow. He was tall and slim with broad shoulders, long arms that dangled far below his coat sleeves. His feet looked as if they might easily have been used for shovels. His nose was long and his entire frame was most loosely hung to-gether.

77

Going Down with Victory.

As we road down Lombard Street, we saw flags waving from nearly every window. I surely felt proud that day to be the driver of the gaily decorated coach. Again and again we were cheered as we drove slowly to the postmasters, to await the coming of his majestie's mail. There wasn't one of the gaily bedecked coaches that could have compared with ours, in my estimation. So with waving flags and fluttering hearts we waited for the coming of the mail and the expected tidings of victory.

When at last it did arrive the postmaster began to quickly sort the bundles, we waited anxiously. Immediately upon receiving our bundles, I lashed the horses and they responded with a jump. Out into the country we drove at reckless speed—everywhere spreading like wildfire the news, "Victory!" The exileration that we all felt was shared with the horses. Up and down grade and over bridges, we drove at breakneck speed and spreading the news at every hamlet with that one cry "Victory!" When at last we were back home again, it was with the hope that we should have another ride some day with "Victory."

83

Venus of Melos:

In looking at this statue we think, not of wisdom, or power, or force, but just of beauty. She

stands resting the weight of her body on one foot, and advancing the other (left) with knee bent The posture causes the figure to sway slightly to one side, describing a fine curved line. The lower limbs are draped but the upper part of the body is uncovered. (The unforrunate loss of the statute's arms prevents a positive knowledge of its original attitude.) The eyes are partly closed, having something of a dreamy langour. The nose is perfectly cut, the mouth and chin are moulded in adorable curves. Yet to say that every feature is of faultless perfection is but cold praise. No analysis can convey the sense of her peerless beauty.

93

A Foreigner's Tribute to Joan of Arc.

Joan of Arc, worn out by the suffering that was thrust upon her, nethertheless appeared with a brave mien before the Bishop of Beauvais. She knew, had always known that she must die when her mission was fulfilled and death held no terrors for her. To all the bishop's questions she answered firmly and without hesitation. The bishop failed to confuse her and at last condemned her to death for heresy, bidding her recant if she would live. She refused and was lead to prison, from there to death.

While the flames were writhing around her she bade the old bishop who stood by her to move away or he would be injured. Her last thought

was of others and De Quincy says, that recant was no more in her mind than on her lips. She died as she lived, with a prayer on her lips and listening to the voices that had whispered to her so often.

The heroism of Joan of Arc was wonderful. We do not know what form her great patriotism took or how far it really led her. She spoke of hearing voices and of seeing visions. We only know that she resolved to save her country, knowing though she did so, it would cost her her life. Yet she never hesitated. She was uneducated save for the lessons taught her by nature. Yet she led armies and crowned the dauphin, king of France. She was only a girl, yet she could silence a great bishop by words that came from her heart and from her faith. She was only a woman, yet she could die as bravely as any martyr who had gone before.

§ 50. *Scientific Studies of School Education*

Science differs from crude opinion by being impartial, by presenting facts in such a way that any competent observer can verify them, and by certain ideals of care, accuracy and close reasoning. Men are just beginning to study the problems of educational results in the spirit and by the methods of science, without personal bias, with detailed records of facts, and with objective descriptions and measurements of what they ob-

serve. As a sample of such work, I present some of the facts found in three investigations of school achievement in arithmetic by Rice, Stone and Courtis.

Dr. J. M. Rice studied the ability to solve problems in arithmetic in the last five grades of eighteen schools in seven cities, measuring it by a written examination, carefully devised and given in all the schools under his own direction.* He found, among other facts, that the results varied widely among the different classes in any one grade. The extremes by his scoring were 9 and 81 for the seventh grade, and 11 and 92 in the eighth grade. He found that the school which did well in one grade did well in other grades also—that is, that superior or inferior achievement was due in large measure to something in the school as a whole. Arithmetic differs in this respect from spelling, in the case of which differences between schools are not nearly so great. Thus, if we measure the work of each class as so much above or below (plus or minus from) the central tendency of all the classes of that grade, we get, for the two best schools and the two very inferior schools, records of:—

	4th grade	5th grade	6th grade	7th grade	8th grade
School A	+10	+14	+22	+48	+49
" B	+15	+19	+23	+31	+38
" X	−11	− 1	−22	−18	−23
" Y	−17	−29	−29	−24	−32

* A full report of this study will be found in the *Forum*, Vol XXXIV (1902), pp. 281–297 and 437–452.

He found that the superiority of certain schools was not due, to any considerable extent, to the allotment of more time to arithmetic in the school program. For example, the time was 53 minutes per day in school A, 60 in school B, 75 in school X, and 45 or more in school Y. His data can also be used for studies of the influence of the size of the class, the age of the pupils, and the wealth of the parents. Dr. Rice finds that none of these are of much moment in causing the differences between schools in arithmetical achievement.

Dr. C. W. Stone made a more careful and complete study* of arithmetical achievements in twenty-six school systems, but in the case of children in the sixth grade only. He found great variations in the results from the teaching in these different school systems. By his scoring the average achievement in the test of the four fundamental operations with integers was, for each system, as shown in Table I, Column A. Similar facts for the test in problems for arithmetical reasoning are shown in Column B of the table. Similar facts for total achievement are shown in Column C. Schools 19 and 5 did, by his scoring, twice as well as schools 23 and 25.

* *Arithmetical Abilities*, 1908.

TABLE I *

School System.	A. Score in Arithmetical Reasoning.	B. Score in Arithmetical Computation.	C. Score in Reasoning and Computation Combined.
23	65	59	62
24	78	113	96
17	81	98	90
4	84	114	99
25	84	70	77
22	85	74	80
16	85	119	102
20	89	70	80
18	92	121	107
15	97	89	93
3	97	92	95
8	98	88	93
6	100	102	101
1	100	94	97
10	109	88	99
2	112	95	104
21	114	95	105
13	115	98	107
14	119	114	117
9	120	109	115
7	133	122	128
12	134	110	122
11	138	105	122
26	144	118	131
19	154	131	143
5	166	115	141

This table shows also that the system which secures facility in the work of computation tends to secure ability in arithmetical reasoning also.

* The scores as entered in this table are due to a complex rating for amount done and accuracy, so chosen as to give, in Dr. Stone's judgment, the fairest measurements of the relative abilities of the different school systems.

The correspondence is by no means perfect, but there is certainly no tendency for schools that get superior accuracy and speed in the four fundamental operations to suffer in respect to the solution of problems.

Of the influence of home training, Dr. Stone says:—

"Environment probably has little effect on arithmetical abilities. Of the five highest systems, the majority of pupils of one came from a crowded tenement district, those of two from exceptionally good homes, and those of two from fair. Practically the same distribution is found among the five systems standing lowest."

The influence of the amount of time given to arithmetic in the school program was found to be zero in the case of achievement with problems demanding reasoning, and not great in the case of computation. For example, systems 9, 14, 7, 13 and 4 devoted, during the first six years of the course, about twice as much of the school time to arithmetic as did systems 22, 25, 26, 21 and 10. But their pupils did hardly any better with the problems, and scored only 111 to the latter's 89 in the fundamental operations. When the estimated amount of home study is included, there is a closer, but still far from perfect, correspondence between the time given to arithmetic and achievement in it. Much remains to be explained by differences in the teaching and supervisory staffs in the different cities.

Mr. Courtis measured the ability of each grade from the third to the thirteenth in September, and again in the following June, in the case of the fundamental operations, problems demanding reasoning, a speed test in reasoning and the speed of the additions, subtractions, multiplications and divisions up to $9 + 9$, $18 - 9$, 9×9 and $81 \div 9$.* As samples of the many facts found I select from his measurements of the increase in arithmetical ability, grade by grade, his evidence that the sixth is a grade of low progress in arithmetic, and his measurement of the loss in power during the summer vacation, and quote his conclusion that the several abilities which, together, make up knowledge of arithmetic are only loosely related, so that each has to be given special attention as a more or less independent ability.

The gain in power to compute and in power to use arithmetical knowledge to solve simple problems that comes as one does the work of grade after grade is shown in Figure 11 and Figure 12, which give the average ability in each grade by Courtis's scoring for the amount of work done correctly in a given time. It will be observed in Figure 12 that after the special practice with arithmetical problems ceases—that is, in the high-school grades—there is little evidence of gain in arithmetical reasoning.

* Measurement of Growth and Efficiency in Arithmetic, in the *Elementary School Teacher,* December, 1910, and March and June, 1911

He finds evidence that the sixth grade is a period of relatively low achievement because, as

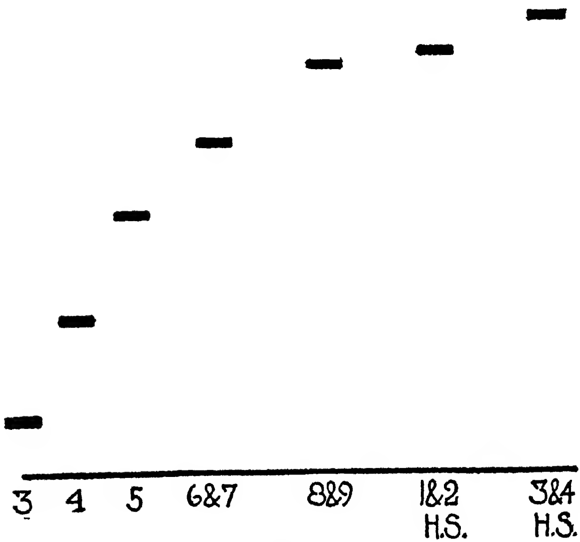

FIG. 11.

FIG. 11. The differences between the different school grades in the amount of computation done correctly in a given time. The numbers 3, 4, 5, etc., along the base-line refer to school grades; H. S. is for High School; the heights of the dashes above the base-line measure the amount of correct computation in the given time. From data given by Courtis.

he believes, of inner physiological handicaps. Whereas the average gains during the school year for pupils in the fifth and seventh grades were 31, 26, 33, 34, 43, 20 and 18 in the seven tests,

they were only 20, 20, 17, 22, 34, 0 and 10 for pupils in the sixth grade—in general, less than

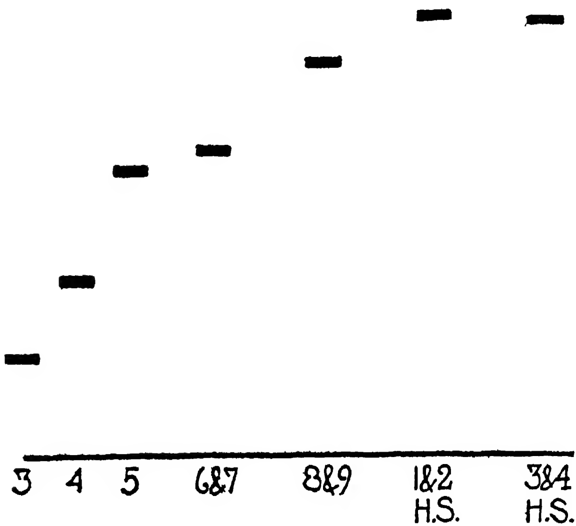

FIG 12

FIG 12 The difference between the different school grades in the number of simple problems done correctly in a given time The plan of the diagram is as in FIG. 11. From data given by Courtis.

two thirds as great. Yet the year before, when they were in the fifth grade, these sixth-grade pupils had done well.

When this set of tests was repeated in September, the influence of the vacation was clearly shown. In the case of the speed or readiness of the simple 'combinations,' the loss from June to

the following September was from a fifth to over a half of the gain made from the preceding September to June. Thus, on the average, the fifth grade gained 29 and lost 19; the sixth gained 20 and lost 4; the seventh gained 26 and lost 7; the eighth gained 28 and lost 8. From experiments made by Dr. W. F. White,* however, it seems likely that this effect of the vacation would be quickly overcome by renewed 'drills.'

Of the specialization of arithmetical abilities, Mr. Courtis says: "It seems practically certain that in the present state of our arithmetic teaching each operation and each part or division of a topic is learned by the child as a separate unrelated activity. There is no coordination, no welding of separate parts into one science of number, no appreciation of the meaning and purpose of arithmetic as a whole. Accordingly the incidental emphasis of the teacher on one topic or another, due to the varying mentalities of the different classes of the same grade, leaves a lasting bias toward skill in one operation or another. It only remains to point out how, in a later grade —a high-school class in algebra, say—a weakness in one operation, masked by a fair general ability, operates to make the best efforts of the teacher of no avail. What is apparently merely a lack of attention or care to details of the algebra, is really due to a deep-rooted defect of previous training

* *American Education,* November, 1906, Vol. X, pp. 185–188.

in some important particular skill. Both class and teacher attack the problem of correction blindly and at a place that may need no correction at all."*

Although the first investigations in any new field are, of necessity, limited and halting, the work justifies Courtis's conclusion that:—"It is practicable to measure, not only the general condition of arithmetic teaching throughout a school, the growth in ability and efficiency from grade to grade, the defects and needs of any one grade or individual, but the *effects of changes in method* or procedure *as well.* By a series of tests, through a number of years, it ought to be possible to build up a real science of teaching and to determine by strict experimental methods the truth or falsity of any educational hypothesis."†

* *Loc. cit.,* Vol. X, p. 181.
† *Loc. cit.,* Vol. X, p. 199.

CHAPTER XII

Education in the United States

It is the purpose of this chapter to present some of the main features of American schools as they now are, some of the changes that are going on, and some of the improvements that the reader may help to bring to pass. Every intelligent teacher, and every broad-minded man or woman, needs to join to an understanding of the general principles of education such as have been discussed, some knowledge of the actual conditions to which, in our country to-day, these principles are to be applied.

Our schools as they are.

Indeed, it will be hard to find many more important questions about our national life than:—How many children and young people are going to school? For how long? Who are they? How many men and women are teaching them? Who are these teachers? What material facilities—buildings, grounds and the like—are used for education? What is taught and studied? How much does all this cost? Who pays for it? What results from it? What progress has been made in the last generation? What can be done now to make American schools better?

§ 51. *The Students*

Some boys and girls never go to school. In large cities some children, often immigrants, are kept from school by their parents' ignorance or greed; some children, orphaned or of careless parents, stay away from school by choice. In both city and country some sickly, crippled, or mentally defective children, for whom adequate provision is not made in hospital or asylum schools, get no systematic education.

How many children go to school?

Just how many children get no 'schooling' is not known. In the better communities, if the school officers knew who were evading or being deprived of school education, so as to count them, they would, so far as they could, put them in school. The number is very small—we hope less than one in fifty.

The men and women of America believe in giving every child a chance in some school. By 1910 all except seven States had compulsory laws. More and more attention is being given to enforcing these laws. The colored children as well as the white are being sent to school; children who live at a distance are being carried to school; the blind and the deaf, the feeble-minded and the crippled, are being provided with special schools. A generation hence we hope not to have to be shamed, as we must be now, by the fact that four

out of a hundred native-born whites, and forty out of a hundred negroes, ten years or more old, cannot even read a simple sentence.

The effort to give every child at least five or six years in school was one great reform movement of the nineteenth century in all civilized countries. The hope that such a democracy of the first elements of knowledge could be possible had showed itself here and there in the seventeenth century. But it was little more than a hope. We do not have to go back so far as that to find a time when so much 'schooling' as the majority of American children now get before they are twelve was less frequent than high-school graduation now is. Man's history began about 240,000 years ago. If, as Professor Robinson has suggested, we think of human history as a day, each hour representing 10,000 years, then the first dawning of the idea of universal education was about two minutes before the present, the movement was fairly under way about half a minute ago, and it has now won an almost complete victory! Within two generations a common-school education changed from a luxury to a necessity for the American citizen.

For how long? The length of school education varies from zero, in the case of some defectives, delinquents and unfortunates, up through all amounts from one to twenty or more years. A first-rate education in medicine, for example, now implies approximately eight years in

kindergarten and elementary school, seven or eight years in high school and college, and four years in medical school. At the end of this schooling those who wish to be fully equipped for work study for two years more in connection with hospital practice.

Percentage of children retained to each age.

Out of every hundred children born in this country, say in 1890, who lived to be twenty-two, the numbers who stayed in school* till they were ten, eleven, twelve, thirteen and so on, were approximately as shown by Figure 13. The shape of this figure, which we may call the *educational pyramid,* deserves careful study.† Note first that, in spite of compulsory education laws, many children do leave school before they are fourteen. Note also that many more children stay beyond thirteen than is the case in England, France, or

* Students who drop out of school and then return are reckoned as having spent the time after return immediately after their leaving. That is, a student who went to school from seven to seventeen, stayed out two years, and then went three years, would be reckoned as staying till twenty. Students in correspondence schools, evening schools, or extension classes of universities are not counted. To 'stay' in school is taken to mean doing full work in some regular institution. There are many other complexities, but none of them need be considered for our present purpose, which is simply to get an idea of the extent to which this country keeps children and young people attending school as their main business.

† The exact determination of the form of the educational pyramid is impossible because of the incompleteness of school records, and the figures given above might be changed somewhat if full information were available. But they are much truer to the facts than one's chance opinion.

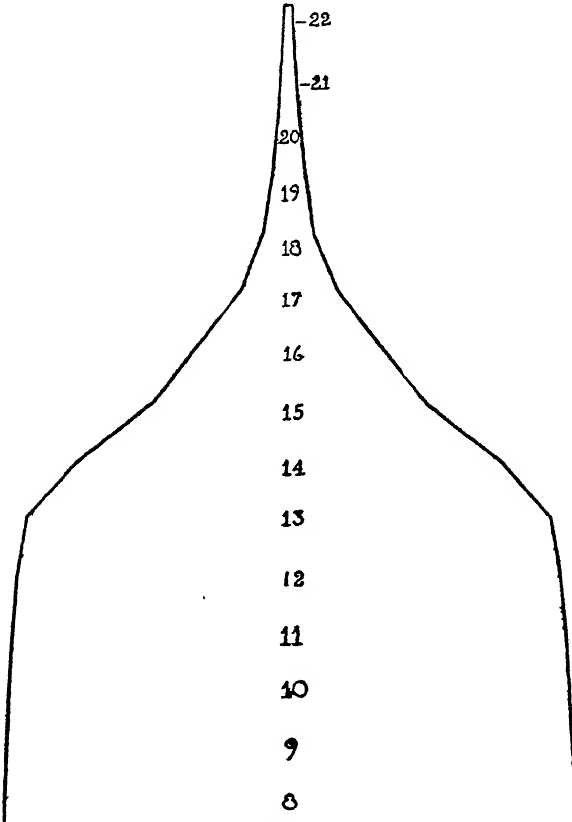

FIG. 13. The educational pyramid; showing by its width at various heights, the percentage of children who remain in school to any given age. A width of three inches equals 100 per cent. The numbers 8, 9, 10, 11, etc., refer to years of age. The diagram represents approximately the condition for children born in the United States in 1892, or eight years old in 1900.

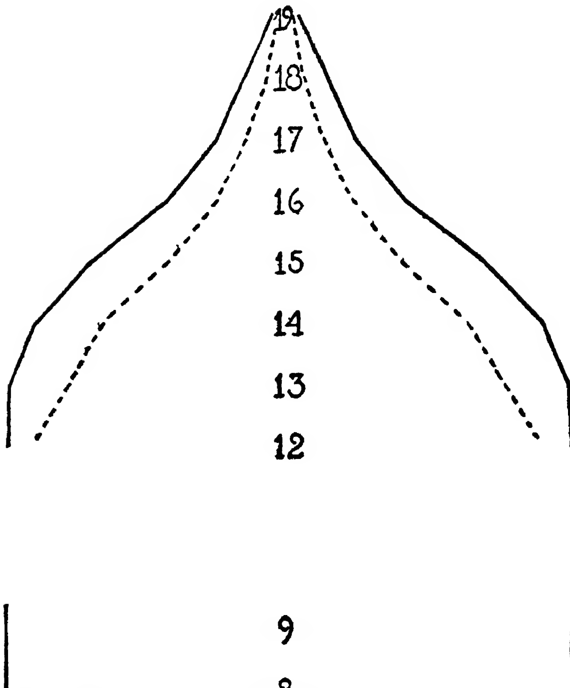

FIG. 14. The pyramid formed by the dotted line shows, by its width at various heights, the percentages which the number of 12-year-olds, the number of 13-year-olds, etc., in school were of the number of 8-year-olds in school in the case of certain American cities in 1890. The pyramid formed by the continuous line shows the same facts in the same cities in 1908.

Germany.* Note, in the third place, that no such sharp falling off occurs at any one age as is often supposed. It is not the case that children fall into two sharply distinct classes—those who complete an elementary course only, and those who complete also a high-school course. Note, in the

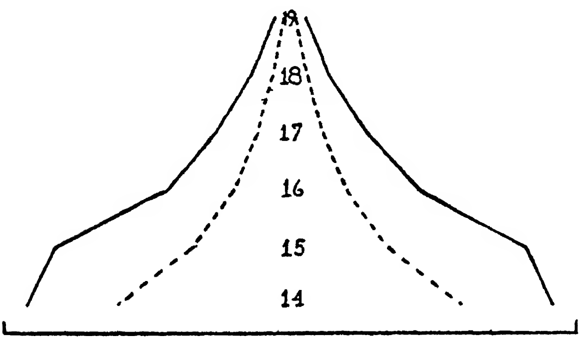

FIG. 15. The pyramid formed by the dotted line shows, by its width at various heights, the percentages which the number of 14-year-olds, the number of 15-year-olds, etc., in school are of the number of 8-year-olds in Philadelphia and St. Louis. Three inches equals 100 per cent. The pyramid formed by the continuous line shows the same facts in the case of Los Angeles, Grand Rapids and Worcester. The data are for 1908.

* The percentage continuing to fourteen, fifteen or sixteen in regular day-schools was, in 1900, at least four times as large in this country as in England or Prussia. Even if all the pupils who are in attendance upon school for an hour or two a day while working are counted in, the number retained in those countries is still far below the number retained here for full-time schooling. On the other hand, it must be borne in mind that the school year is in these countries longer than it is in the United States.

fourth place, that this pyramid has been widening out, from the base up, during the past twenty years. This is shown in Figure 14, which gives the age-distribution of the public-school children in certain cities in 1890 and in 1908.

There are great differences between communities in the length of the schooling their children receive. Compare, for example, the facts for Philadelphia and St. Louis on the one hand with those for Los Angeles, Grand Rapids and Worcester on the other, shown in Figure 15. Yet Philadelphia and St. Louis are by no means at the bottom of the list in respect to holding children in school.

Improvement in the number retained in school.

The changes that are being made in opportunities and requirements for school attendance are filling out the pyramid toward the form shown in Figure 16. Present laws are being better enforced. The compulsory age is being raised to sixteen by the wiser communities; high-school graduation is being required for normal-school entrance; some college work is being required for entrance to schools of medicine and law. Graduate schools of business administration, college courses in journalism, railroading and household arts, agricultural high schools and trade-schools for boys and girls from twelve to sixteen, are illustrations of the many enterprises which are prolonging school education.

Thus to release people more and more from

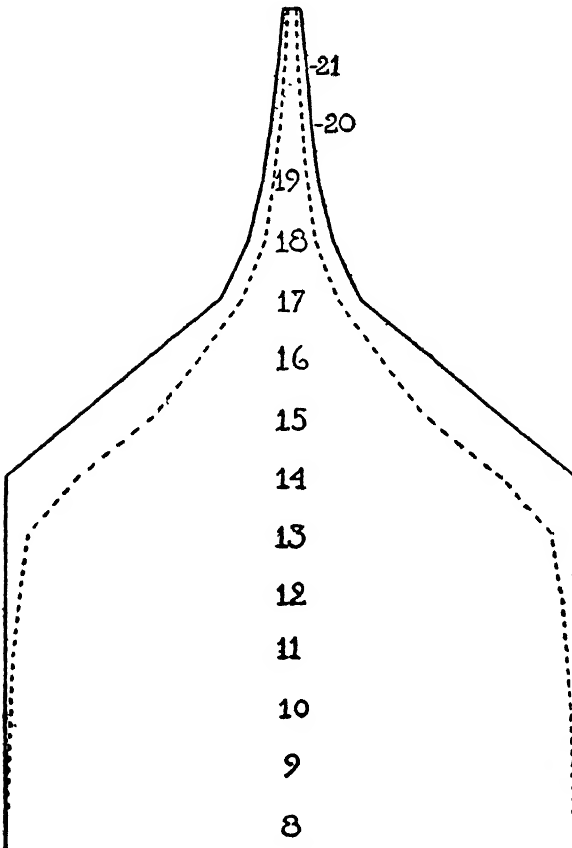

FIG. 16. The educational pyramid for 1908 (dotted line) and the form toward which present improvements are changing it (continuous line).

ordinary labor when they are young and protect them by proper early training from disease, ignorance, waste, misery and baseness, is for the general good. Of the lifetime one has to live for the world, a large portion—say, from 18 to 24 years, according to the individual's nature—is best spent in activities chosen for their value in making his whole life finer and more serviceable, irrespective of their immediate money price. The community that bravely insists on protecting the young against being used up in helping the community get a living, soon finds itself getting a better living, and other things of much more worth.

Systematic education may also be prolonged by compromising with the requirements of self-support. Various plans are being devised whereby the advantages of regular school training may be had by self-supporting students. For example, in the University of Cincinnati and in the High School of Fitchburg, a pair of boys may, in certain departments, share one place in school and one apprenticeship in some industrial establishment, taking turn and turn about in alternate weeks. The custom of requiring employers to free young people for certain hours per week to attend so-called *Continuation Schools* has recently become very common in Germany and is likely to be adopted here. The evening schools are developing from semi-charitable means of casual and inferior schooling into institutions

with well-planned courses, regular grading, and skillful instruction in subjects fitted to the nature and needs of young people.

Increasing the length of the school year. At the same time and for the same reasons that more children are given some schooling and that children are being kept in school for more years, the school year is being made longer. This may be either as a requirement or as an opportunity. The change from the old short-term 'winter school' and 'summer school' of the days of our parents or grandparents, to the thirty-eight or forty weeks' requirement of our better communities to-day is a case of the former. The addition of vacation schools for children, or of summer terms in universities, is a case of the latter.

As a result of all these changes, the length of schooling in days for the average American child is reported by the United States Bureau of Education as having increased by over fifty per cent. in the last generation (1879–1909).

Which children are retained? Which pupils continue in school till twenty-five and which drop out at twenty, fifteen or twelve is a matter of importance. Suppose the tenth of children whose parents were the wealthiest to continue,—or suppose the tenth of children who were least able to earn money to continue,—or let a tenth who were all girls continue,—or let the tenth who were most backward in school achievement continue,—or let the tenth whose school education would

add most to the welfare of the world continue. Obviously the value of increased schooling varies according to who gets it. It is a greater evil to turn some children out from school at fourteen than to turn out others.

It is, of course, impossible to give here the necessarily enormously complex answer to the question, *Who stays in school in America?* Nor does any one fully know the answer. I shall give only a few samples of the facts about the selective activity of the schools in the case of one city —New York. These facts will be given in the form of diagrams showing the median length of stay in high school of certain sorts of pupils.* Each half-inch in the lines of Figures 17 and 18 equals one school year; each quarter-inch, one term or half-year.

Pupils in the top tenth of the entering class in general ability, according to the judgment of their teachers, stay in high school over four times as long as those in the bottom tenth. Those in the top tenth in a similar ranking for industry also stay over four times as long as those in the bottom tenth. The pupils in the top third in ability stay nearly three times as long as those in the bottom third; those in the top third in industry, nearly two and a half times as long as those in the bottom third. Pupils who attained an aver-

* Median length of stay for any group of pupils is the length so chosen that just as many of the group stayed longer than it as stayed not so long as it.

age mark of 80 to 100 in the first few months' work stay in high school five times as long as those who attained marks under 50, three and a half times as long as those whose marks were from 50 to 60, and two and a half times as long as those whose marks were from 60 to 70.

Figure 18 shows that children of wealthy parents, as shown by the amount paid for rent, do not stay in high school appreciably longer than children of even very poor parents. It shows also that the kind of pupil who expects to enter one of the professions stays from two to three times as long as the kind of pupil who expects to go into business.

It is encouraging to find the schools retaining the intellectually able rather than the rich, to so great an extent as these diagrams show. It may be hoped that when the high schools provide training for the boy or girl who, though not gifted in abstract scholarship, has executive ability and skill in the practical arts, the schools will hold the future leaders in business and industry as they now hold the future leaders in the professions.

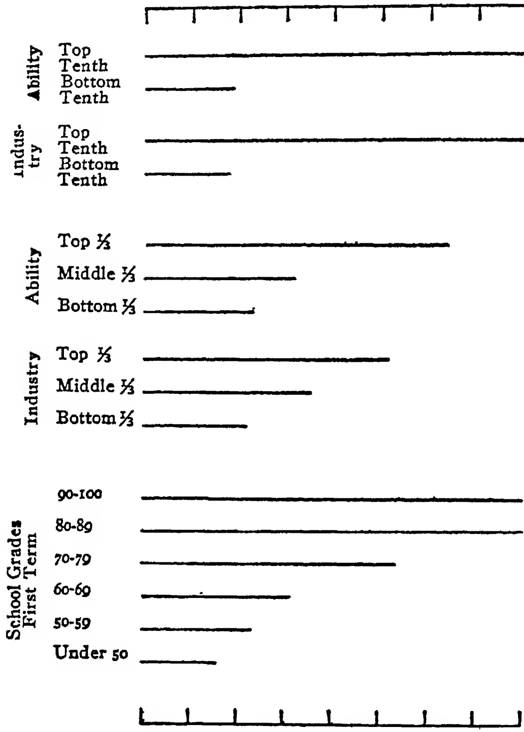

FIG. 17. The median length of stay in the high schools of New York City in the case of different sorts of pupils. Each quarter-inch equals one half-year, as by the scale-lines at the top and bottom. The horizontal lines give, in order, the median length of stay of:—

The top 10% in ability as judged by the teachers during the first two months.

The bottom 10% in ability as judged by the teachers during the first two months.

The top 10% in industry as judged by the teachers during the first two months.
The bottom 10% in industry as judged by the teachers during the first two months.
The top 33⅓% in ability as judged by the teachers during the first two months.
The middle 33⅓% in ability as judged by the teachers during the first two months.
The bottom 33⅓% in ability as judged by the teachers during the first two months.
The top 33⅓% in industry as judged by the teachers during the first two months.
The middle 33⅓% in industry as judged by the teachers during the first two months.
The bottom 33⅓% in industry as judged by the teachers during the first two months.

Those who got in the first term an average grade of 90–100.
Those who got in the first term an average grade of 80–89.
Those who got in the first term an average grade of 70–79.
Those who got in the first term an average grade of 60–69.
Those who got in the first term an average grade of 50–59.
Those who got in the first term an average grade of below 50.

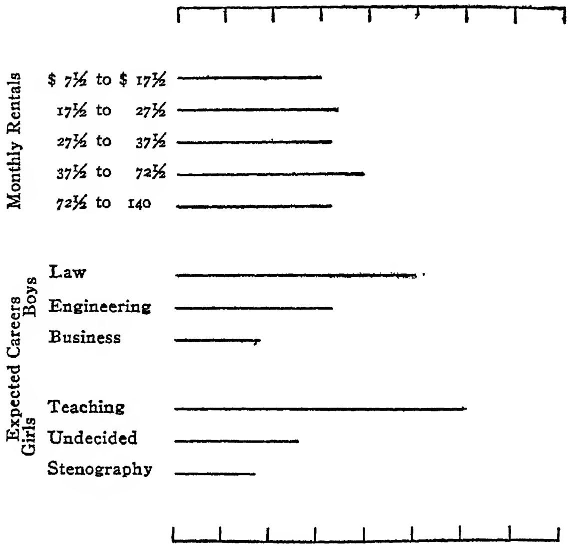

FIG. 18. The median length of stay in the high schools of New York City in the cases of different sorts of pupils. Each quarter-inch equals one half-year. The horizontal lines give the median lengths of stay, related to different amounts of family expense for rent, and to different reports as to expected career, made by the boys and girls in question at entrance to the high school.

The data for FIGS. 17 and 18 are taken from *Causes of the Elimination of Students in Public Secondary Schools of New York City*, by J. K. Van Denburg.

§ 52. *The Teachers*

There were in the United States in 1910 somewhat more than half a million men and women engaged in teaching. In making this estimate, I reckon two individuals, each of whom fills a position supposed to take up one half a person's working-time, or three individuals each of whom fills a position supposed to take one third of a person's time, as one teacher. This educational army is about five times as large as the country's military force; about equal in number to the force of clergymen, engineers, physicians and lawyers combined; about twice as large as the force engaged in making and selling alcoholic drinks.

Their number.

The character of this educational force is not so uniform as that of the country's legal, medical or religious force. Teaching varies from a temporary occupation to a life-work—from an accidental occupation to a profession seriously prepared for—from a side-issue in the activity of a musician, physician or farmer, to the sole business of a specialist in education—from 'minding children' to the systematic training of the world's most important workers.

There is, as yet, no 'typical' teacher.

Teaching is, however, changing toward the status of a profession deliberately chosen, requiring preparation, and holding its members through-

out their working lives. The teacher in a city high school, even now, does spend approximately the same time in preparation and pass something like the same tests for admission to the work, as is the case with a physician or lawyer.

The feminization of teaching.

In the public elementary and secondary schools of the country nearly four fifths of the teachers are women. In cities and towns of 8000 and over, more than nine tenths of the teachers, and over half of the supervising officers, are women. In large cities the percentage of women is still higher. Since the country districts follow the lead of the cities and towns in most matters of general school policy, we may expect that the country as a whole will soon be leaving nine tenths of the work of teaching to women.

Men have left the lower grades of teaching almost exclusively to women, and are rapidly leaving the higher grades as well. The reader's grandfather very likely never had a woman as teacher, his sixteen-year-old brother may never have had a man. Within the last generation (1879–1909) the proportion of men teachers in public schools has been cut down by over half. The number of men actually dropped, while the number of women much more than doubled.

The increased percentage of women in teaching is one feature of the general fact commonly known as the widening of women's sphere. In the twenty years from 1880 to 1900, the number

of women physicians doubled; the number of women in government offices trebled; the number of women journalists and editors quadrupled; the number of women in business increased five-fold; the number in dentistry, sixfold; the number in literary and scientific work, tenfold; the number in the ministry, over tenfold; and the number in technical, engineering and electrical work, over fifteenfold. So far as data can be had, the increase is shown to have continued from 1900 till now.

The quality of American teachers.

The welfare of a nation obviously depends on the quality, as well as the number, of its school-teachers. The men and women who have control of children and young people for a large fraction of their lives—who direct their opinions about the facts of the world and form many of their habits of thought, feeling and action, who fit future lawyers, physicians, clergymen, engineers, accountants, nurses, and the like for their professions, and who are assuming a larger and larger share of the work of fitting the next generation for all its duties and privileges—should obviously be themselves first-rate in intellect, morals and skill. A nation which lets incapables teach it, while the capable men and women only feed or clothe or amuse it, is committing intellectual suicide. Conversely, an enormous future gain is made by taking an Eliot for Harvard College rather than for a cotton-factory; or by letting William James dis-

cover truth and teach our sons, instead of curing their ailments as a medical practitioner. Of the general problem of utilizing every individual's original capacities so as to have each do his most for the common good, there is no more important part than saving, to teach us, those who can do it well.

It is hard to estimate just what sorts of men and women are now entrusted with the work of teaching. The only available general guides are the salaries they receive, the amount of education they have had, and the repute in which they are held by those who know them.

Salaries. The amount of salary received by teachers is a measure of their quality, but a very imperfect and incomplete measure. A man of fine character and acute intellect may be impelled by love of a scholarly life to teach for far less money than he could earn otherwise. A man who lacks the ability to handle tools, to boss laborers, to drive a bargain, to invest money, or to earn a living otherwise than by teaching, may be of very great value to the world without having that value recognized and paid for. So salaries are an index of a mixed result from three factors—the individual's abilities, the community's judgment of their value, and the keenness of the two parties in bargaining for the former's labor.

The assistant professors of the hundred universities and colleges which stand highest in re-

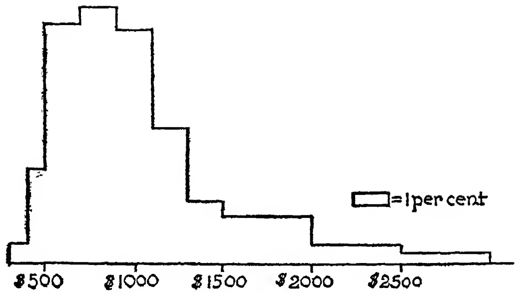

FIG. 19.

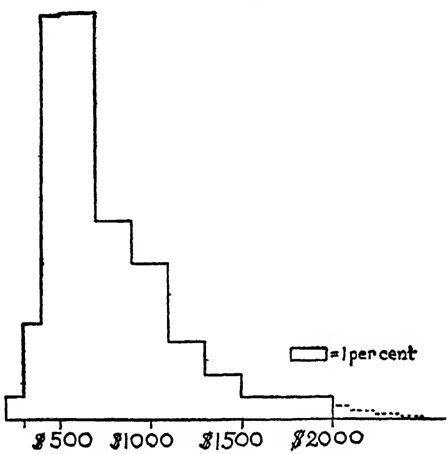

FIG. 20.

FIGS. 19 and 20 show the relative frequencies of different amounts of salary for men (FIG. 19) and for women (FIG. 20) teaching in public high schools, by the percentage of the area that lies above any given portion of the horizontal scale. Thus, in FIG. 19, we see that salaries of from $500 to $1100 are very common, that salaries below $500 occur in only about five *per cent.* of

pute in this country may be taken to represent the teachers engaged in higher education. Such men are, with few exceptions, from twenty-eight to forty-six years old, and have spent eleven years beyond the elementary school in study. Their typical financial history is to begin teaching in a college at twenty-seven, to earn an average of $1325 for the next nine or ten years, to receive $1800 by the age of thirty-seven, and eventually to get salaries of from $2000 to $3000.

Figure 19 and Figure 20 show the facts as to salary for teachers in public high schools. The median salary for the men is $900; that is, of the men engaged in public high-school work, there are as many who receive less than $900 as there are receiving more than $900. Of a hundred such men five receive less than $500; fifty-one receive from $500 up to $1000; twenty-seven, from $1000 up to $1500; ten, from $1500 up to $2000; and seven, from $2000 up. Over half of them receive from $600 to $1000, inclusive.

For the women the median salary is $650. Of a hundred women, twenty-two receive less than $500; fifty-nine, from $500 up to $1000; fourteen, from $1000 up to $1500; and five, $1500 and over.

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the cases, salaries of $1500 to $2000 in about ten *per cent.* of the cases, and so on. Such a *surface of frequency* or *surface of distribution* has the advantage of showing to the eye at one glance the variability of salaries as well as their central or average tendency.

Figure 21 and Figure 22 show the facts for five thousand teachers studied by Dr. Coffman. These

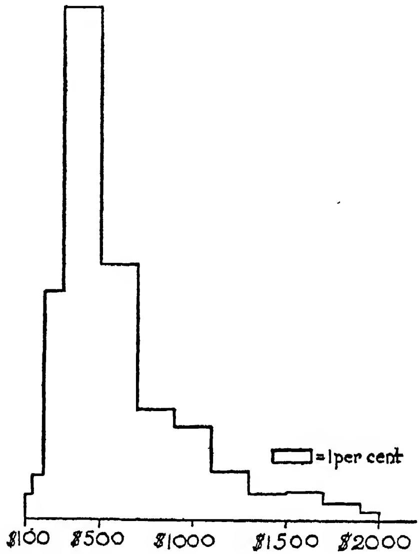

Fig. 21. The relative frequencies of different amounts of salary for men teaching in elementary schools (plus a small admixture of high-school teachers). The arrangement of the diagram is as in Figs. 19 and 20.

were taken to represent as nearly as possible the general condition of teachers in public elementary and secondary schools, but it is probable that the secondary-school teachers were not fully represented. In any case, Dr. Coffman's figures may be taken to represent the salaries of elementary-

school teachers plus a small number of high-school teachers.

For the men, the median salary is a little under

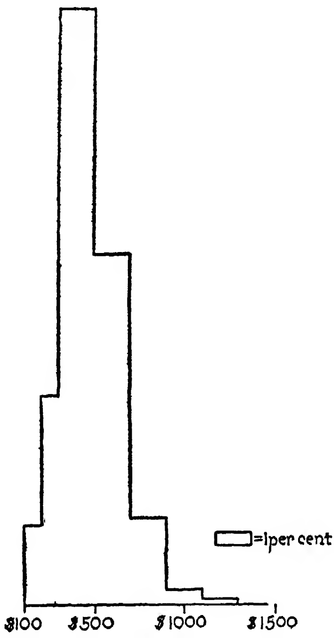

FIG. 22. The same as FIG. 21, but for women instead of men.

$500. Of a hundred men, four received less than $250; forty-eight, from $250 to $500; twenty-three, from $500 to $750; eleven, from $750 to $1000; seven, from $1000 to $1250; and seven,

$1250 or more. Half of them receive salaries between $363 and $615; four fifths of them receive salaries between $250 and $950.

For the women, the median salary is $450. Of a hundred women, five or six receive less than $250; fifty-six receive from $250 to $500; thirty-two, from $500 to $750; and six or seven, $750 or more. Nearly half of the women receive salaries between $340 and $560; four fifths of them receive salaries between $250 and $650.

Financial provision for better teachers. There are two lines of improvement to be made in the quality of the teaching force by means of salaries. The first is to advance salaries and educational or personal requirements together for teachers of all grades. If a woman, to be fit to nurse our children when they are sick, needs two years' training beyond high-school graduation, and an annual salary of six or eight hundred dollars, so does a woman, to be fit to teach them when they are well. The second is to dignify the profession by very great rewards for very great services. If it is desirable that a man be given by his fellow-men a hundred thousand dollars a year by reason of his possession of expert judgment concerning the value of real estate, or railroad bonds, or the legality of a business combination, the equally gifted expert in education should receive at least as much—if he wants it. He deserves it equally, and is equally likely to use it for the common good. As a matter of fact,

a middle course is still more desirable: the money reward for expertness in trading is as much too high as that for expertness in science and education is too low.

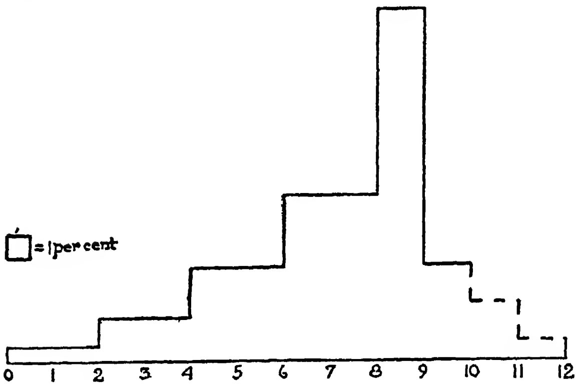

FIG. 23. The amount of education (in years beyond the elementary school) of men teaching in public high schools. The diagram shows that about three *per cent.* of these teachers had less than two years of education beyond the elementary school; that about seven *per cent.* had from two to four years of education beyond the elementary school; that about sixteen or seventeen *per cent.* had from four to six years; and so on.

Length of education. The amount of education which teachers have themselves had is important as a partial measure, not only of their training for the work, but also of their native capacity. For continuance through high school and normal school or college means, commonly, superiority in intellectual interests and capacities, and

in the moral qualities of perseverance, stability and good will.

The facts for teachers in public high schools are shown in Figure 23 and Figure 24. Of a hundred men, ten have had less than four years beyond the elementary school; forty-five have had

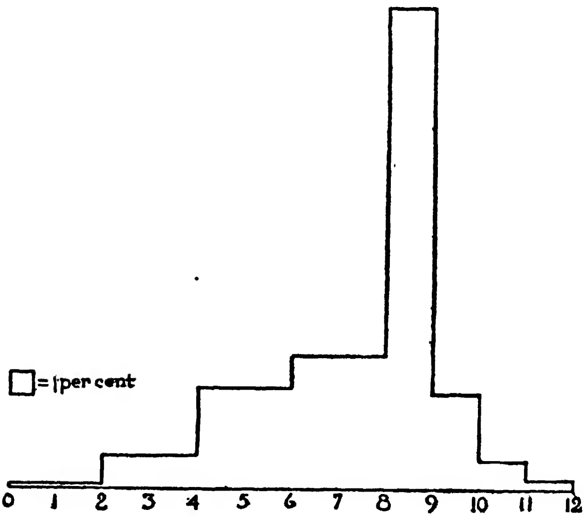

FIG. 24. The same facts as FIG. 23, but for women.

from four up to eight years; thirty have had eight years; and fifteen have had nine years or more. Nearly three fifths have had six, seven or eight years. Of a hundred women, six or seven have had less than four years beyond the elementary school; forty or forty-one have had from four

up to eight years; forty-one or forty-two have had eight years; and eleven or twelve have had nine years or more. Nearly two thirds have had six, seven, or eight years.

Of the men and women teaching in the ele-

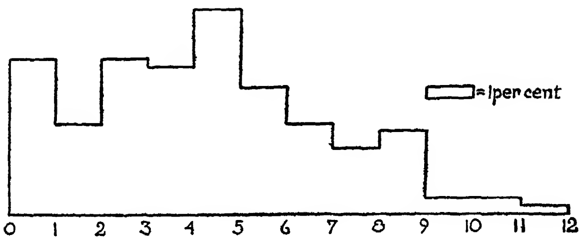

FIG. 25. The amount of education in years beyond the elementary school, in the case of men teaching in the elementary schools (plus a small admixture of high-school teachers). The construction of the diagram is as in FIG. 23.

mentary schools, two thirds have had three, four, five or six years of education beyond the elementary school. Somewhat over two tenths have had less than this, and somewhat over one tenth have had more. Figure 25 and Figure 26 show the facts in detail.

Educational provisions for better teachers. The two chief lines of desirable immediate improvement of teachers with respect to previous training are: —first, that it be longer, and, second, that it be more dignified and exacting.

As was suggested in the discussion of salaries, teachers of all grades need more training. To

manage human beings well is a more complex and difficult task than to manage chemicals or electric currents. It takes longer to acquire competence as a human engineer than as a civil or mechanical engineer. As men realize the many

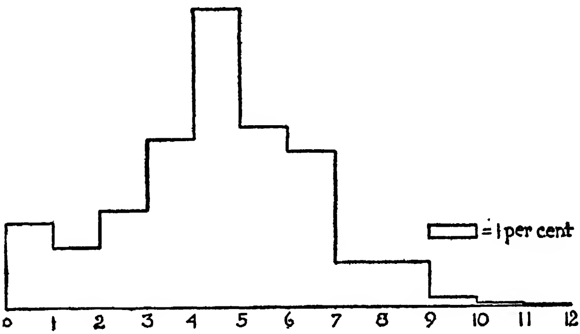

FIG. 26. The same facts as FIG. 25, but for women.

things that can be done to make a teacher more effective, they will realize the necessity of saving much waste throughout the teacher's working life by spending more time upon his training. Very soon six, and then seven, and then eight, years beyond the elementary school will be required for entrance to the profession of teaching. Some of the mechanical work of changing human nature may be turned over to individuals of less training, as the engineer turns over certain routine construction to carpenters, masons, or machinists. But the real teacher, the architect of human lives, will soon be required to possess at least such expert

knowledge and skill as only a first-class student can gain in a full four years beyond high school.

This knowledge will not be simply knowledge of the mathematics or sciences or languages which are to be taught, but will include rigorous scientific treatment of the problems of education itself. The teacher of the future will think out from scientific principles the best way to teach a given child to subtract or divide, as the engineer thinks out the best way to bridge a given river or tunnel a given hill. The study of these principles and their applications will demand as great talents and as close application as the study of the principles upon which medical or engineering practice rests.

The typical teacher in elementary schools.

There is, as has been shown, a great variability in the teaching profession, but the following quotation from Dr. Coffman describes roughly the 'average' teacher in elementary schools, and shows how much still remains to be done in both financial and educational provisions:—

"The typical American male public-school teacher is twenty-nine years of age, having begun teaching when he was almost twenty years of age, after he had received but three or four years of training beyond the elementary school. In the nine years elapsing between the age he began teaching and his present age, he has had seven years of experience and his salary at the present time is $489 a year. Both of his parents were living when he entered teaching and had an

annual income from their farm of $700, which they were compelled to use to support themselves and their four or five children.

"His first experience as a teacher was secured in the rural schools, where he remained for two years at a salary of $390 per year. He found it customary for rural-school teachers to have only three years of training beyond the elementary school, but in order for him to advance to a town-school position he had to get an additional year of training.

"The typical American female teacher is twenty-four years of age, having entered teaching in the early part of her nineteenth year, when she had received but four years' training beyond the elementary schools. Her salary at her present age is $485 a year. When she entered teaching both of her parents were living and had an annual income of approximately $800, which they were compelled to use to support themselves and their four or five children.

"Her first experience as a teacher was gotten in the rural school, where she remained but two years. If she went from there to a town school, her promotion was based almost solely upon her experience, as no additional training was required by the officials of the town. If she desired to teach in a city school, she was compelled to secure at least one more year of training, but each additional year of training, she found, increased her salary."*

* L. D. Coffman, *The Social Composition of the Teaching Population*, pp. 79–81, *passim*.

The community's judgment of the intellect and character of its teachers is not recorded in figures or presentable in diagrams. But certain facts show that, although we pay to teachers of children hardly more than to skilled laborers, and to professors in the hundred best colleges of the country only about as much as to successful commercial travelers, we regard the teachers, in each case, as an abler class. First, the number of teachers who are offered higher salaries in other occupations is very large. In the second place, a large number of women teachers are chosen in marriage by men of ability, and a large number of men teachers are accepted in marriage by women of ability. In the third place, the recent organizations for public welfare, such as those for the prevention of tuberculosis, the administration of charitable funds, the establishment of playgrounds, the abolition of child labor and the forwarding of international peace, have found among teachers many of the men and women best qualified to do their work. It is, in fact, generally recognized that teachers in all grades are paid less than they deserve, are respectable and trustworthy citizens, and are more competent to manage men, money and opinions for the public service than any other group, save possibly the clergy, who are paid as little.

Public estimation of teachers.

The public esteem of teachers and their work for the world has risen within the last century.

Satires with the ignorance, brutality and crudity of teachers as their topics are less frequent. The feeling that teachers work from a spirit of public service as well as from economic necessity is growing. Parents in cities and towns where the teachers have had six years of education beyond graduation from the elementary school are, more and more, regarding the teacher as an expert to give rather than take advice.

This public esteem should be increased by getting superior men and women to teach, training them more adequately and paying them more, and also by showing the nation the importance of education as a means to its welfare. The time should come when a family that pays its cook more than its governess will be a laughing-stock, and when a community will be judged primarily by what it does for and with its young people.

CHAPTER XIII

Education in the United States (*concluded*)

§ 53. *Organization and Courses of Study*

Organization of schools. The organization of schools in America, being controlled by no central authority, is so extremely complex and variegated that the ordinary educational worker can be expected to know it only in a general way.

To fit age. One chief factor in determining organization is the age of pupils. In most cities kindergarten or preparatory, elementary, and secondary or high schools are designed roughly to fit, by years or half-years, what are thought to be the needs of children four to six, seven to fourteen, and fifteen to nineteen years old. The American college is in large measure a school for young people from eighteen to twenty-three. Age counts much more as a factor than in England or Germany, where the chief division is into schools for children of the so-called 'lower classes' and schools for the very small minority who in those countries may be expected to continue their education into the late teens and twenties.

Ability fuses with age to determine the organization. Thus the secondary schools, in spite of statements to the contrary, are actually arranged for more gifted, as well as older, pupils. So, indeed, to some extent, are the upper grammar grades. The pupil who can just barely satisfy the requirements of the first five grades in five years often fails to complete grades six to eight in three years. In the case of education beyond the high school, ability may even outweigh age as a basis for organization. Special and general defects have led to schools or classes for the blind, deaf, crippled, feeble-minded, dull, truants, juvenile delinquents and other special groups.

To fit ability.

To fit careers and studies.

The third factor determining organization is, of course, the subject to be studied or the career to be prepared for. The kindergarten shows little or no organization according to the subjects of study. The elementary school is just beginning to do so, trade-schools being split off to do their special work, promotion by subjects being introduced, and specialization of teachers by subjects being encouraged. The secondary schools already include divisions such as the *Classical, English, Commercial* and *Manual Training*. They may have courses in special preparation for teaching, library work and various trades. Many very specialized schools, as for intending railroad workers, telegraphers, printers, actresses and young ladies of fashion, are roughly

of secondary grade in respect to the age and ability of their pupils.

Education beyond the age of eighteen, except in the 'college,' is organized chiefly by the subjects of study, the schools being classified as medical schools, law schools, theological schools, schools of education, finance, commerce, art, music, and the like, the time required for each certificate, diploma or degree being determined as six months, a year, two years, four years and so on by the amount of knowledge or skill to be given, and the selection of pupils and teachers being made on the basis of fitness to learn and to teach the particular subjects in question.

Common types of schools. The common forms of organization may then be pictured as in the scheme outlined below.

PRE-ELEMENTARY **Roughly, 4–6½**	*Markedly defective children* *All others*	
ELEMENTARY **Roughly, 6½–15**	*Markedly defective children* *'Special' class children* *All others*	Organization by careers and subjects of study just beginning in the higher grades.
SECONDARY **Roughly, 14½–19;**	*and of superior ability, or interest, or both*	College preparatory General academic Commercial Technical Teachers' courses Trade Agricultural

HIGHER Roughly, 18–30;	*and of superior ability, or interest, or both*	Academic Law Ministry Medicine Teaching Engineering Agriculture Commerce Philanthropy The fine arts The useful arts, including those of the household, etc., etc.

Varieties due to lack of facilities.

These common forms of organization may be disturbed by local lack of facilities. In rural communities the kindergarten and elementary schools may be fused, the separate grades of the latter may not be distinguishable, and the secondary school may be lacking, or have only a three- or two-year course. Where public secondary schools are rare, so-called colleges will be found doing their work. There is almost every gradation from a clean-cut, fully graded system, as in large cities, to a single teacher doing what he can for pupils from five to fifteen. The eight or nine grades customary in the elementary schools of Northern cities dwindle to six in many Southern towns. There are forty times as many high schools with only one teacher as there are with ten teachers. Of the colleges legally conferring the bachelor's degree, nearly a third have an annual income* less than one tenth of that of the so-called typical

* Exclusive of fees paid for board.

small college, such as Amherst, Williams or Wesleyan.

Varieties due to special customs.

These common forms of organization are further disturbed by all sorts of special aims and customs. Thus in some cities there are two classes of secondary schools,—those with the usual four years' course, requiring the completion of the elementary-school course for entrance; and those with a six years' course, accepting pupils who have completed three fourths of the elementary course. Many high schools have added a postgraduate course of a year. Some law, medical and scientific schools require college graduation for entrance; some require two years beyond high school; some accept high-school graduates.

Finally, prejudices of race, caste and religion do somewhat influence the organization of our schools. The public schools for the colored population in Southern States are not the same as for the white; where a city has several high schools, one may be unconsciously managed to suit the so-called 'better' classes; the Roman Catholic Church pays the cost of elementary education in order to organize it for the inculcation of certain religious habits; the sectarian foundations for secondary and higher education often retain at least the right to do so.

As a result of all these and other forces, American education shows an almost infinite variety of institutions. For example, public elementary

schools vary, in number of pupils, from four to four thousand. They vary, in the fraction of the total course that is in charge of one teacher, from one sixteenth to all of it. Even city schools vary in the number of pupils in attendance per teacher from below twenty-five to over fifty. They vary, in the length of the school year, from much under one hundred up to two hundred days. They vary, in the salary to class teachers, from $2500 down to $250 and less.

The course of study in the pre-elementary school.

Only a small fraction of American children go to school before they are six. Of these, many begin directly with the work of the first grade of the elementary school. Those who are enrolled in pre-elementary schools have the curriculum which Froebel devised three generations ago, but somewhat enriched and adapted to American conditions. It is remarkable that this particular scheme of education should have been adopted so much more widely and absolutely in the United States than in any other country. And it is probable that the particular toys, songs, games and 'busy work' which Froebel chose, and the sequences which he recommended, will soon lose their preeminence, being replaced by better devices which the Froebels of to-day and to-morrow will discover. It is also remarkable, and in my opinion fortunate, that the English custom of teaching reading, writing and spelling to children four and five years old is almost nowhere imi-

tated in this country. It is being abandoned in England.

The course of study in the elementary school.

The traditional elementary-school course represents the *three R's* of our grandparents' days, plus a great deal more of the three R's, and also plus geography, the history of this country, drawing and music, and in some communities elementary science (called nature study, and most popularly a rather gentle study of plants and birds). Manual training, including sewing and cooking, and gymnastics are often added. The beginnings of certain high-school studies are sometimes offered in the last grade of the elementary school. In a few rare instances vocational courses are given in trade-schools of elementary grade.

There is a variation from cities that retain a curriculum to-day substantially the same as the author remembers from thirty years ago, which was in turn the extension into an eight years' course of what was provided for his father sixty years ago, to cities where the newer subjects have been welcomed. The courses of study of two cities, not ten miles apart, shown in Figure 27, represent this variation in moderate degree.

There is much variation in minor details. The portion of the total school-time given up to arithmetic ranges from an eighth to a fifth. The portion given up to spelling ranges from a fortieth to over a tenth; the portion given to history ranges from a thirtieth to a fifteenth. These variations

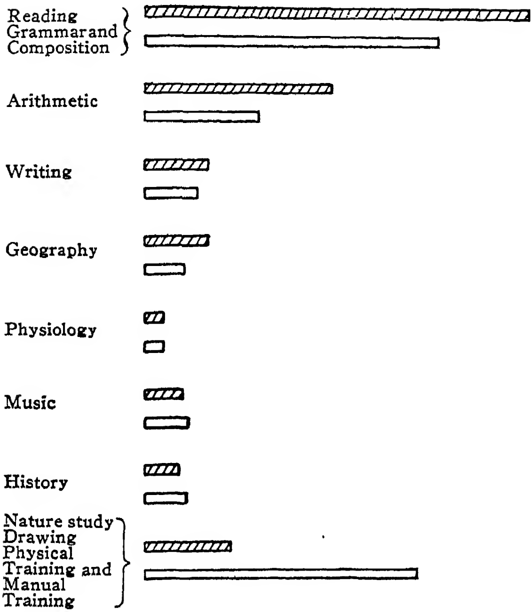

FIG. 27. The division of the school program among the different school subjects in the case of two cities. The facts in the case of the city which favors the newer subjects are represented by the unshaded strips.

are, however, consistent with two uniformities. In general, the elementary-school curriculum in the United States is alike for all pupils, permitting no election of studies, and is almost exclusively academic.*

* The ungraded schools, which in general imitate the courses of study of city schools as far as their facilities will allow, agree almost unanimously in these two uniformities.

These two features are, however, both being questioned. There is, indeed, hardly a single educational expert who thinks that the hundred thousand sixth-grade children in New York City should all study the same things, or that they should all study nothing but academic subjects. The experts will agree that the offering made by the schools should be broadened and in some measure 'professionalized' or 'vocationalized.' And probably nobody who has thought about the matter sufficiently will disagree with them. The men and women who see no reason to give children an education different from what was given fifty years ago forget that the number of days of schooling has increased by half since then, that things can be done in a school of twenty-five teachers and a thousand pupils that could not be done in a school of five teachers and two hundred pupils, and, most important of all, that the conditions of home life, community life and industry have changed enormously.

Future changes in elementary schools.

The traditional elementary-school curriculum will soon be broadened and fitted to vocations as the college curriculum has already been. Vocational education will be given as freely as academic education. Some children will be learning to take care of a gasoline-engine, or to apply the test for the butter-fat content of milk, or to typewrite, instead of to name the capes and bays of Africa, to extract square root, or to tell who

wrote *Thanatopsis*. And many children who now leave school altogether will be learning in school to do their work in life better and to enjoy it more.

Changes in secondary and higher education.

The course of study in American secondary schools grew up as a hybrid from that of the Latin schools and that of the academies of two generations ago. The Latin school perpetuated itself in the college-preparatory course, which until recently gave half its time to Latin and Greek, and in a general reverence for Latin. The academy perpetuated itself in the 'English' course or 'Academic' course and in the 'Scientific' half of the 'Latin-Scientific' course. For a while the high-school course tolerated only the languages, mathematics, history and the genteel sciences. When commercial subjects were introduced they were put in a separate and degraded course by themselves.

It still retains signs of its ancestry, but the movement toward enrichment and vocational usefulness that is barely beginning in the elementary curriculum is fairly under way in the high school. There is every reason to expect that any moderately long-lived student of this book will see agricultural, technical and trade courses (including those in the household arts, nursing and the like for girls) increase to be as large a proportion of secondary-school curricula as agricultural, engineering and professional courses now are of the curricula of higher education.

The changes that have already taken place may be illustrated by comparing the offering of almost any city high school in 1911 with its offering twenty years ago. In the case of one school chosen haphazard, such a comparison of the number of courses in each subject, with allowance for the amount of class work per week, gave the following results:—

The offering in Latin and Greek remained the same.

The offering in modern foreign languages increased by two thirds.

The offering in English increased by one fifth.

The offering in history and civics increased by one third.

The offering in mathematics increased by one half.

The offering in physics, chemistry, biology and other sciences increased by one fourth.

The offering in commercial subjects increased fifteenfold.

The offering in household and industrial arts and sciences rose from 0 to over fifty half-year courses averaging four points a week of class work; or, if we regard mechanical drawing, pattern-making, forging, sewing, cooking, chemistry of foods, dietetics and the like as the development from drawing—the only form of hand-work present in the school twenty years ago—there

was an eighteenfold increase. Figure 28 shows these facts all together.

The 'socialization' of the schools.

One of the most important changes that are taking place in our country's schools is their rapid acceptance of duties other than the mere instruction of children. Either as activities of the school system itself, or in close connection with it, we are establishing medical inspection in schools, nurses' visitations of homes, gymnasiums and playgrounds, school luncheons, special facilities for cripples, guidance of school athletics, study-rooms open till evening, school libraries and museums, traveling libraries and collections, evening lectures and entertainments, children's and parents' clubs, school banks, employment bureaus and offices for guidance in the choice of a vocation, school gardens and farms, and many other extensions of educational work far beyond mere teaching and lesson-getting. The school system of a community is becoming an agency ready to act for the community's welfare in almost any way. Its buildings are becoming centers for the community's study and recreation; its teachers are trying to cooperate with all forces for betterment; its aims are becoming those of education in the widest sense—to make all men want what is good, and to get for all men the goods that they deserve.

We hope that the schools can thus widen their own work and at the same time stimulate parents

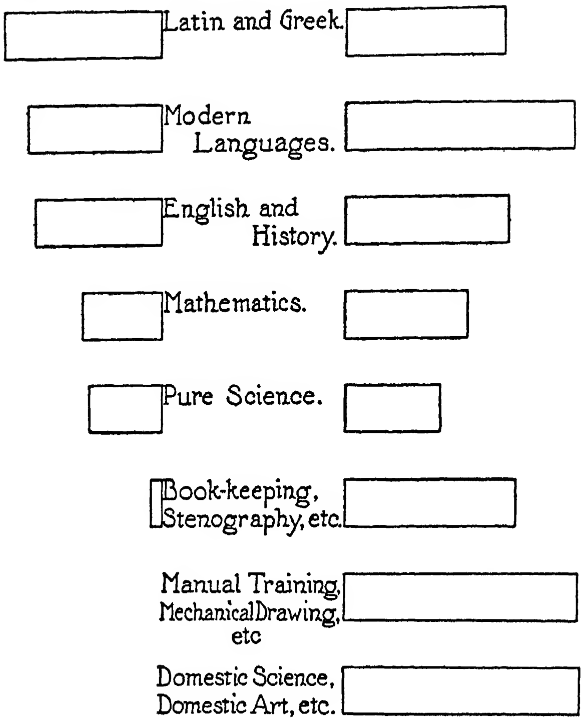

FIG. 28. The offering of a high school in 1890 (at the left) and in 1910 (at the right). The size of the rectangles measures, in each case, the number of different courses given in the subjects in question, each course being multiplied by the number of periods per week which are given to it. The number of sections or classes taking the same course is not considered. That is, it makes no difference whether a given course in English is given once or repeated five times.

to do better by their children, children to do bet ter by their parents, churches to do better by thei neighborhoods, governments to do better by thei citizens, and citizens to do better by one anothei If they can assume responsibility in communit affairs without any loss of the energy which th family and religious organizations of the pas commanded, there will be a clear gain from th widening of the school's aims.

§ 54. *Fiscal Aspects of Education*

Material equipment.

The value of the land, buildings, furniture an apparatus used for school purposes in the Unite States is, according to figures give by the Bureau of Education for 1909 about fifteen hundred million dollars. Over nin tenths of this is owned by the public or by trus tees for practically public use, and may be liste with roads, public waterworks, libraries, park and the like, as a part of the property that th nation has acquired and will use, as well as i knows how, for the common good. On this prop erty there is an indebtedness of not even tw hundred million dollars. The invested funds an lands held as endowment for public schools wer valued in 1909 at over three hundred and fift million dollars. The funds belonging to second ary and higher schools which are administere for the benefit of the public were over two hun dred and fifty million dollars. Each person in th

United States may therefore be said to own, or have held in trust for him, about twenty dollars' worth of land, buildings, equipment or endowment funds, devoted to school education.

Roughly, one and a half per cent. of the total property of our country is held by the public, or in practical trust for the public, for service as school grounds, buildings, equipment and endowment. This may seem a very small fraction, and all truly patriotic men and women will certainly work to increase it, but it is beyond anything that the world has hitherto known. It seems pitifully small when one learns that in three years' time the nation expends as much for alcoholic beverages,—or that the cost of the Civil War in pensions alone would have paid for it twice over,—or that, by cutting the expense of our army and navy to what it was in 1897, we could double school facilities and endowment in ten years. It seems great when one considers that within a generation it has more than quadrupled, and that a few generations ago it was practically *nil*.

Community ownership of schools. Public ownership is gaining rapidly over private in the case of the material facilities for education. For instance, in the last twenty years, the increase in the value of the plants of privately owned secondary schools, even including those held in trust for practically public uses, was only forty million dollars, whereas the increase for public high

schools controlled absolutely by the community for the community's work was over two hundred and thirty million dollars.

In education we are all converts to government ownership, believing that the facilities for educating the next generation belong in the power of all men. Peacefully, and without attracting notice, the work of education has passed from the control of individuals and churches. Each community is coming to own the tools for educating all its members. Privately owned schools for fundamental education seem likely to become in another century as rare as privately owned highways or canals now are.

Differences between communities. The variation among communities in the extent to which they have developed material facilities for public education is instructive. The average community in Massachusetts owns seventeen times as much elementary- and high-school property per inhabitant as does the average community in Mississippi. The acquisition of public and semi-public property in the form of libraries, parks, playgrounds, baths, museums and the like runs somewhat closely parallel to the acquisition of school property, so that the variation is doubly significant. Further, where the public by taxing itself does most, there private philanthropy also is likely to do more. Provision for an educational plant, when taken with provision for teachers' salaries and current supplies, is thus perhaps the best

single symptom of the degree of intellectual and moral advance of an American community.

Expenses for maintenance.

The amount spent in 1909 for the maintenance of schools* of all sorts controlled by the public, or by trustees for practically public uses, was about four hundred million dollars. This country spends for education (per capita, or per child to be educated, or per dollar of the country's wealth) far more than England, France, or Germany. On the other hand, we spend for education, apart from new buildings, less than twice as much as for tobacco, and only about two and a half times as much as for military pensions. The value of the buildings that burn down in the course of the year would pay half the bill for public education!

Their increase.

The amount is increasing. The sum spent for salaries for public elementary and secondary schools was, in 1870, not quite a dollar per thousand inhabitants; in 1890, about a dollar and eighty cents; in 1909, over two dollars and sixty cents. The increase in the financial support of State universities and other institutions administered for the public welfare was even greater. But this increase is even yet short of wisdom and justice. As a country grows richer, a larger and larger fraction of its income should be invested in the training of its men and women. Just as a family which gave $200 out of

* 'Maintenance' does not include any expenses for additions to the permanent equipment.

$2000 to the education of its children could well afford to give $400 if its income rose to $3000, and $800 if it rose to $4000, so a nation should give to education an increasing tithe from every increase in its income.

Their variations. Different communities vary enormously in the amount that they spend on the public education of each child who lives to be twenty. Thus, Worcester and Springfield, Mass., spend two and a half times as much per child as Atlanta, Ga., and Richmond, Va.; Alameda spends over three times as much per child as New Orleans. The variation in the case of smaller communities would be as great.

This variation is due to the fact that the children in the more fortunate cities attend school to a later age and higher grades, and still more to the fact that more money is spent per day's schooling. The cost for one pupil for one day's schooling in the public elementary and high schools of the country as a whole is, exclusive of the use of the school buildings and furniture, about sixteen cents.* His share of the cost for teachers' and supervisory officers' salaries is

* It is well to note this fact. Every proposal for education should bear in mind the fact that a full year's schooling is to be given for (on the average) twenty-five to thirty dollars in the elementary school, and about fifty dollars in the high school. Speculative writers about education often suggest means and methods of education in total disregard of the limits set by the limited funds for schools. The problem is always of the best that can be done with a given amount of money.

twelve cents. In Worcester, however, the corresponding figures are twenty-one and fifteen cents, while in Richmond they are thirteen and a half and nine and a half cents.

School receipts. The money for schools, exclusive of proprietary schools managed for private gain, comes in part from fees paid by students, in part from the gifts of private individuals, in part from public lands set aside for schools, and in part from taxes on individuals in proportion to the property they own. In the case of elementary and secondary schools, fees from students are now perhaps less than a twentieth of the receipts, gifts and the interest on previous gifts perhaps another twentieth, the income from public grants of land and from taxes making up at least nine tenths. In the case of higher education, fees from students, income from past and present gifts, and a property tax share more equally. But even in higher education, grants of public money now exceed either income from endowments or fees paid by students. Fees from students make up each year a smaller fraction, and although the gifts of individuals to desirable forms of education are greater in the United States than in any other country and are increasing in amount, they seem destined to play relatively a smaller and smaller part in the support of education. Education is becoming, throughout, something neither to be sold to the rich nor be-

stowed as a charity on the poor, but to be given to all as a public investment.

The public management of a material equipment worth a thousand million dollars, and of a yearly budget of over four hundred million dollars, by the communities concerned, is one of the world's greatest experiments in democracy—and one of its most successful ones. As a rule, privately owned schools do not give as good an education, even at greater cost; nor do they treat their employees as well; nor do those in control of them show as much enterprise in seeking improved means and methods.

Fault can be found with our attitude toward schools. It is, doubtless, below what idealistic hopes desire. But in the willingness of men of wealth to be taxed that all men's children may have opportunity, in the general honesty of school officers in spending school funds in the community's interest, and in the general acceptance of the welfare of the community as the aim of its schools, we have the proof that, in at least one case, men can do better work as servants of the people than they would have done under the competition of the market for private gain, and the promise of a time when all men will work together for the common good.

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